VOLUME 10 • NUMBER 5 • *May 1955*

Geriatrics

DEVOTED TO DISEASES AND PROCESSES OF AGING

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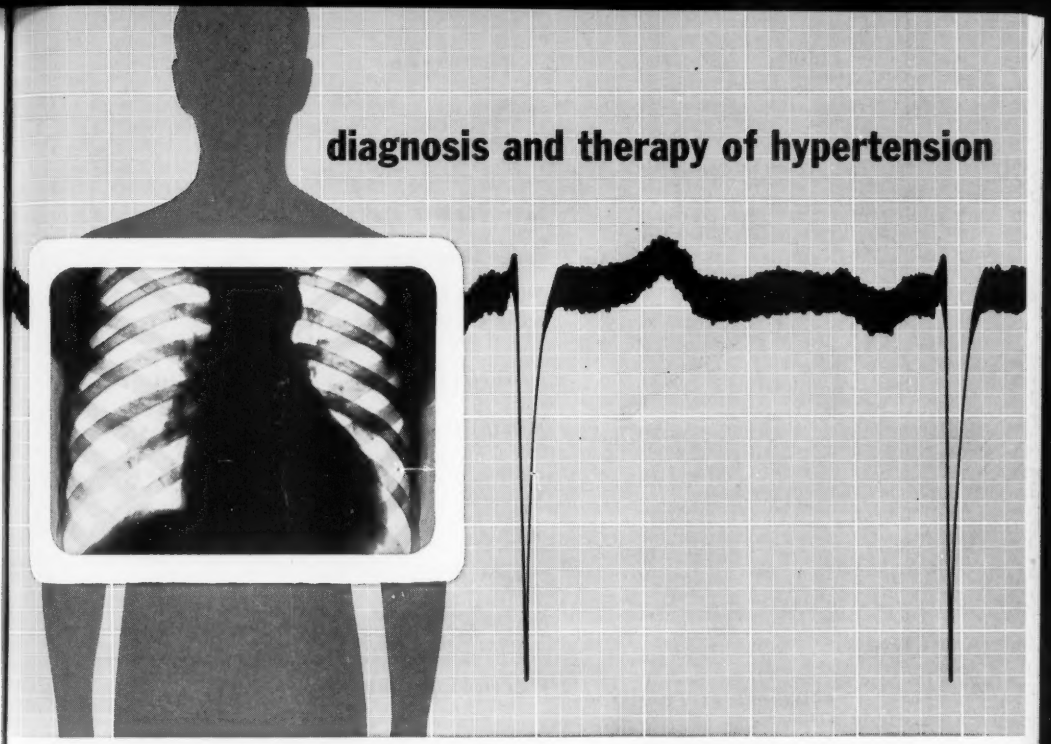

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1. Crawley, C. J.; Silvis, G. M.; Stumpe, W. M., and White, L.: New York State J. Med. *54*:2205 (Aug. 1) 1954.
2. Doyle, A. E., and Smirk, F. H.: Lancet *1*:1096 (May 29) 1954.

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(1) Pareira, M.D.; Conrad, E. J.; Hicks, W., and Elman, R.: J.A.M.A. 156: 810, 1954.

(2) Therapeutic Nutrition, Publication No. 234, National Research Council.

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Volume 10
Number 5

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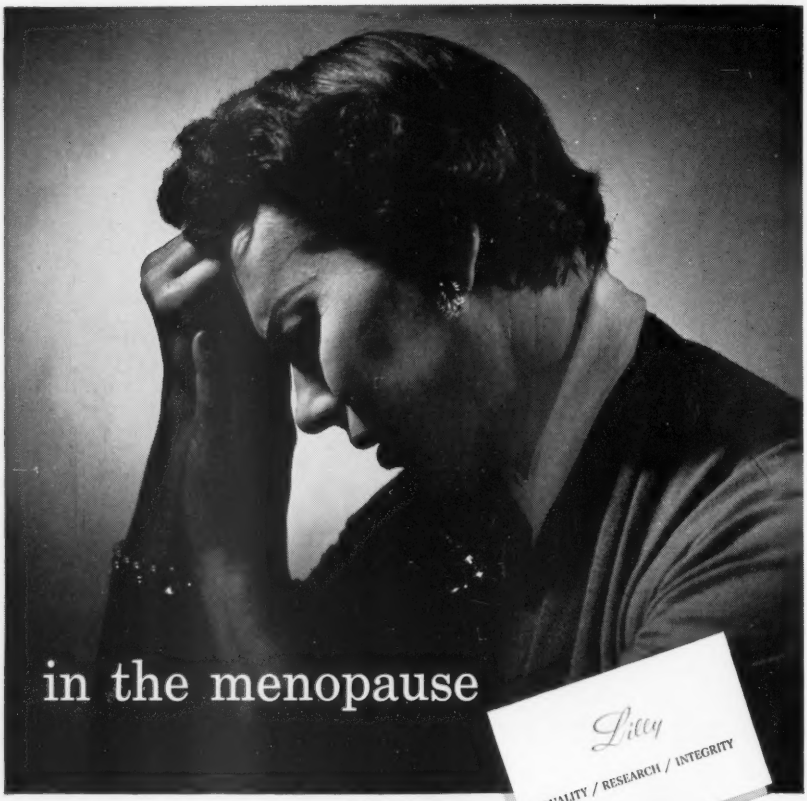

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. . . looking forward

● Stress and the so-called diseases of adaptation, which are due principally to an imperfect adjustment to stress, play a prominent role in geriatrics, because the pathogenic actions of exposure tend to be cumulative and become most evident during the later years of life. Writing in the June Geriatrics on *Stress and Disease*, Hans Selye, director of the Institute of Experimental Medicine at the University of Montreal, predicts that research on stress will be most fruitful if it is guided by the theory that we must learn to imitate, and if necessary to correct and complement, the body's autopharmacologic efforts to combat the stress factor in disease.

● Alterations in the older skin have an important bearing in certain allergic dermatoses because the associated severe pruritus tends to persist and to be more resistant to therapy in older than in younger skins, according to Rudolf L. Baer and Ludwig Schwarzschild of New York University - Bellevue Medical Center. The three most common allergic eruptions in persons over 50 are allergic eczematous contact dermatitis, allergic drug eruptions, and allergic urticaria. Discussing *Selected Allergic Skin Diseases in Older Persons*, they stress that topically and systemically administered medicaments are among the most frequent causes of such allergic eruptions.

● A study of *The Nutritional Status of Noninstitutionalized Aged Persons* was made by Leila Kaplan, Jacob H. Landes, and Jerome Pincus of the Lower East Side Health Center, New York City Department of Health. They found that almost 95 per cent of a group of 53 ambulatory persons over 60 had one or more clinical manifestations of vitamin deficiency. Forty per cent had a deficient intake of calories and total proteins, and one-half to two-thirds had a diet deficient in essential vitamins, iron, and calcium.

● *The Physiology of the Aging Process in the Musculoskeletal Apparatus* is primarily concerned with the synthesis of bone protein, writes Edgar M. Bick of the Orthopedic Service of Mt. Sinai Hospital, New York City. Articular cartilage is a relatively avascular tissue which, when not injured by major trauma or repeated minor traumata of mechanically unsound joint function, is apt to persist undamaged well into the late decades. Muscle tissue remains all but unchanged except as its power is influenced by circulatory or central nervous system deterioration.

● At least 80 per cent of those who attempt suicide in old age are suffering from depressions, according to I. R. C. Batchelor, deputy physician superintendent, Royal Edinburgh Hospital for Mental and Nervous Disorders. Follow-up study has shown that nearly two-thirds of these depressives may be expected to recover, but that 20 per cent of the recovered may relapse and that 15 per cent may die of physical illness within two years. Any relapse of the old person into depression must be given urgent treatment with full recognition of the serious suicidal risk.

For these and other articles, reviews, abstracts, and special features, read every issue of Geriatrics.

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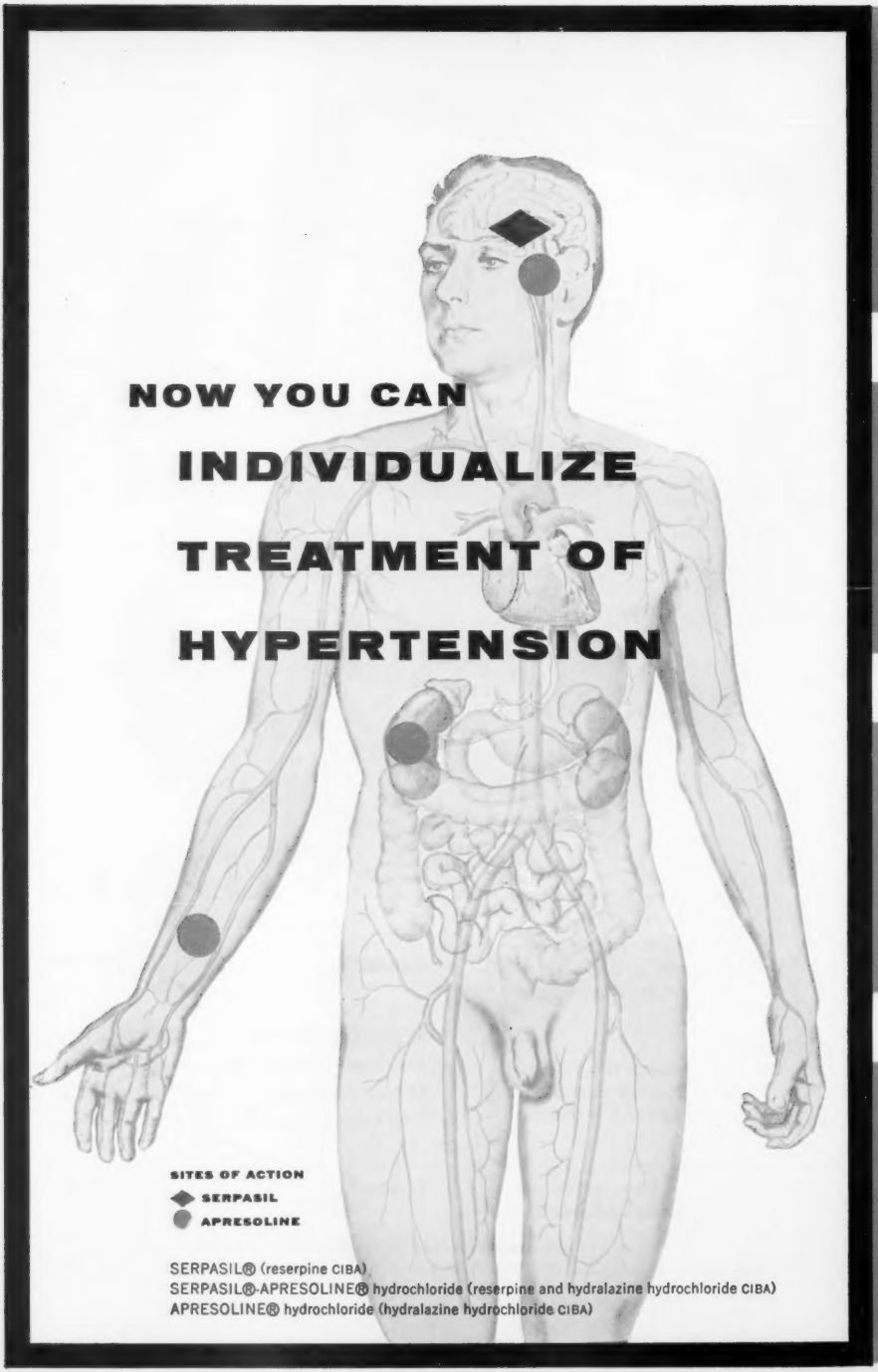
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References: (1) Lawrence, E. D.; Doktor, D., and Sall, J.: Angiology *2*:405, 1951. (2) Rottino, A.; Boller, R., and Pratt, G. H.: Angiology *1*:194, 1950. (3) Boller, R.; Rottino, A., and Pratt, G. H.: Angiology *3*:260, 1952. (4) Pratt, G. H.: Surg. Clin. North America *33*:1229, 1953.

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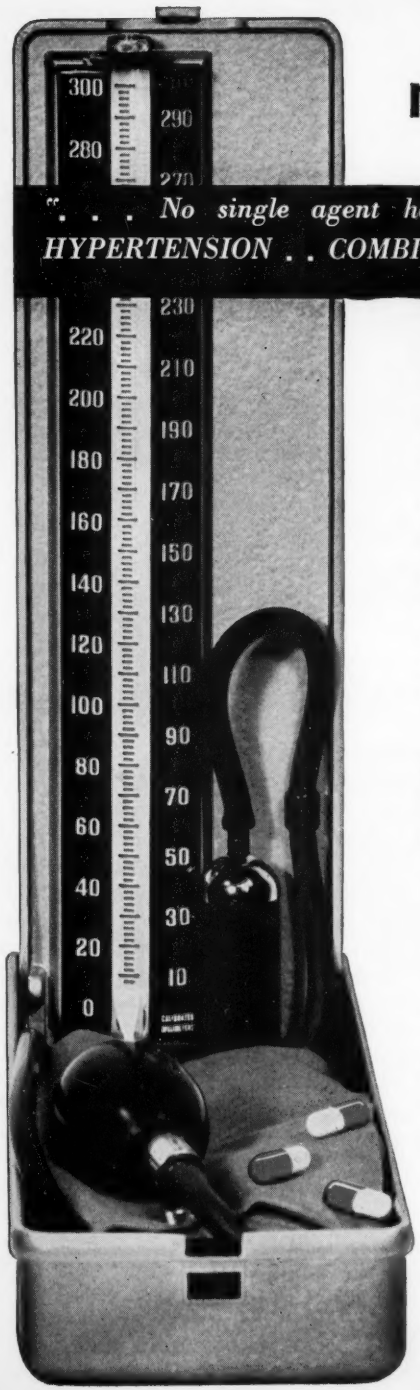

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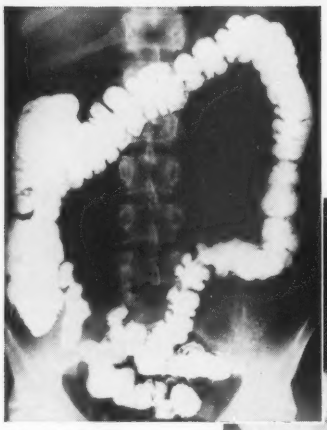

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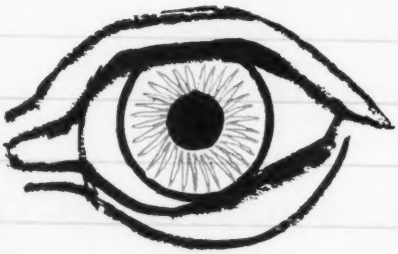

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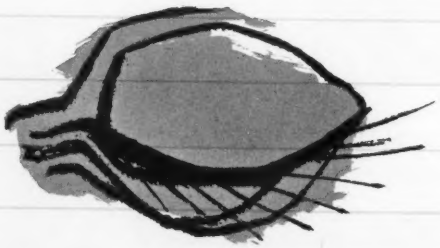

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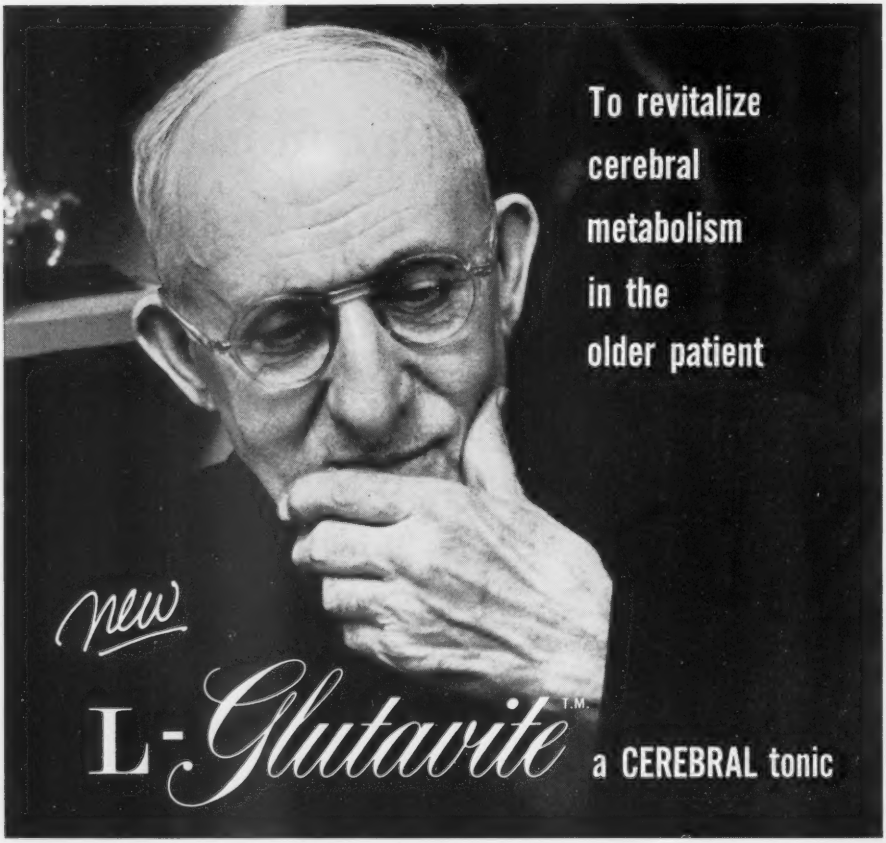


L-Glutavite is specifically formulated to assist in the treatment of geriatric patients whose symptoms of weakness, apathy and fatigue are characteristic of waning cerebral metabolism. Himwich[1] reports excellent results with sodium glutamate in such cases, while Lehmann states that "a trial with nicotinic acid is always indicated . . ."[2] By combining these key factors with other vital nutritional elements, L-Glutavite effectively increases cerebral blood flow while it enhances the ability of cerebral tissue to utilize the increased nutrients provided. This unique therapeutic formula helps the tired, the apathetic, the depressed individual to face life more actively, and with greater interest.

Supplied in cartons of 30 individual dosage packets; initial dose, 3-5 packets per day for 5 to 6 weeks. Pleasant-tasting appetite-stimulating powder, to be mixed in fruit juices or sprinkled on food. Contains monosodium L-glutamate, niacin, thiamine, riboflavin, ascorbic acid, ferrous sulfate and dicalcium phosphate, in high potencies.

1. Himwich H.E.: Paper presented at American Psychiatric Association meeting, St. Louis, May, 1954.
2. Lehmann, H.: 27th Annual Conference, Milbank Memorial Fund, New York, Paul B. Hoeber, Inc., 1952. p. 587.

GP GRAY PHARMACEUTICAL CO., INC., Newton 58, Massachusetts

The Moodbound, the Leaden-Eyed . . .

These are the patients dulled by mild depression—the listless, lagging, defeated, cheerless. For them Oral WYAMINE offers smooth, gentle stimulation to banish the jaded, arid outlook, to revive mettle and resolution. In therapeutic doses, Oral WYAMINE elevates the mood—with little risk of amphetamine-like side-effects. For lasting lift without post-therapy depression, hyperexcitation, or disturbance in appetite.

Dosage: May range from 6.25 to 50 mg. daily, taken in 1 or 2 doses. Many patients experience a diurnal variation in mood—marked by morning depression. Under such circumstances, a single dose in the morning is often sufficient.

Supplied: Tablets, 25 mg. (scored), vials of 24 and bottles of 100; also, 12.5 mg. (scored), bottles of 100. Elixir, 25 mg. per 5-cc. teaspoonful, bottles of 1 pint.

Wyeth®
Philadelphia 7, Pa.

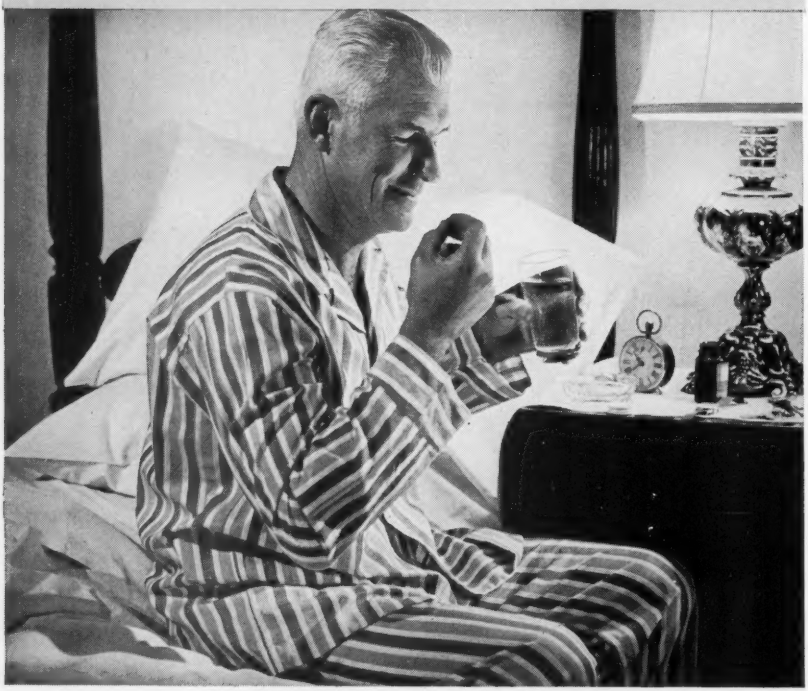
NEW **WYAMINE** SULFATE
TABLETS ELIXIR
MEPHENTERMINE SULFATE
Mood Amelioration without Excitation

Somnos®

CAPSULES AND ELIXIR CHLORAL HYDRATE

"one of the safest of all sedatives"[1]

MAJOR ADVANTAGES: Induces "natural sleep and sedation without medullary depression."[2] Affects no vital function.



SOMNOS is well tolerated even by the older patient

SOMNOS induces quiet, restful sleep – without after-effects. SOMNOS contains only *chloral hydrate* – "an effective somnifacient which merits wider use."[3]

Within an hour of taking SOMNOS, your patient usually will be asleep. It will be a quiet, restful sleep, from which he will awaken refreshed – without unpleasant after-effects.

When necessary, the person who has taken SOMNOS may be awakened easily. SOMNOS is especially valuable for the insomnia of the elderly,[4] as well as for cardiac and psychiatric patients.[2]

SHARP & DOHME

Philadelphia 1, Pa.
DIVISION OF MERCK & CO., INC.

References: 1. Mod. Med. 19:59, 1951. 2. West Virginia M. J. 49.292, 1953. 3. Pharmacology and Therapeutics, Phila., Lea & Febiger, 1954, p. 146. 4. Geriatrics 9:303, 1954.

prior to
plastic pelvic surgery

in atrophic
or senile vaginiti
and pruritus vulvae

TOPICAL ESTROGEN THERAPY

Ortho®
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vaginal estrogen therapy

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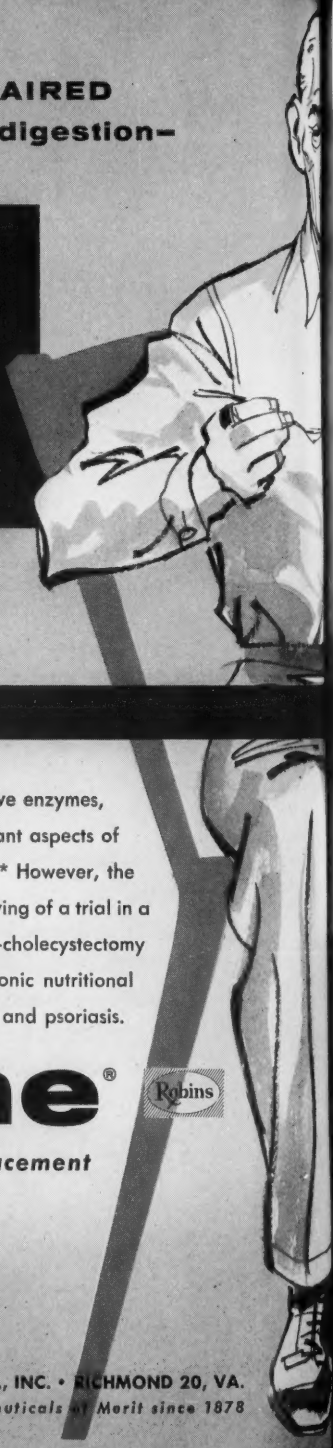
WHEN NUTRITION IS IMPAIRED by aging digestion—

*"Nutrition is more than diet. Proper nutrition includes . . . also the digestion of foods in the alimentary canal, their absorption, transport . . . and utilization . . ."**

*"The secretion of digestive enzymes . . . diminishes with advancing age. . . . Therefore considerable interference with the digestion of foods is to be anticipated."**

*Strieglitz, E. J.: J.A.M.A. 142:1070, 1950.



By supplementing the patient's own secretion of digestive enzymes, ENTOZYME compensates for one of "the more significant aspects of aging which affect nutrition in the second forty years."* However, the usefulness of ENTOZYME is not limited to geriatrics, but is deserving of a trial in a variety of conditions such as dyspepsia, food intolerance, post-cholecystectomy syndrome, subtotal gastrectomy, pancreatitis, and chronic nutritional diseases such as diabetes mellitus, atherosclerosis and psoriasis.

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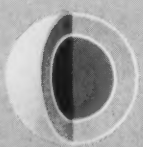
Robins

Comprehensive Digestive Enzyme Replacement

Each double-layered tablet contains:



Pepsin, N.F. .....250 mg.
—released in the stomach from gastric-soluble outer coating of double-layered tablet

Pancreatin, U.S.P.....300 mg.

Bile Salts .....150 mg.
— released in the small intestine from enteric-coated inner core

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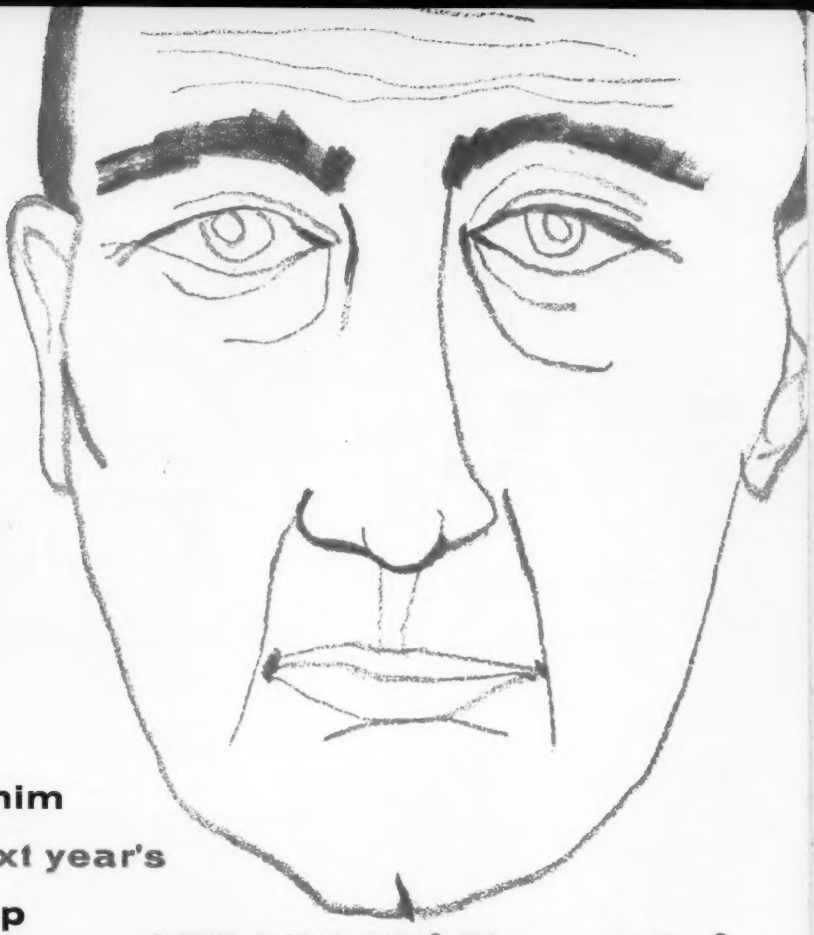

to help him pass next year's check up

GERIPLEX® Kapseals®

geriatric vitamin-mineral combination

GERIPLEX is specifically formulated to help safeguard health and vitality in middle and in later life. Each easy-to-take GERIPLEX Kapseal supplies valuable mineral nutrients, eight important vitamins, plus the starch-digestant, Taka-Diastase®, and rutin.

dosage One Kapseal daily is usually used to supplement the regular dietary, though dosage may be increased during febrile illnesses, pre-operatively or post-operatively, or whenever the possibility of vitamin-mineral deficiency is increased.

GERIPLEX Kapseals are supplied in bottles of 100 and 500.

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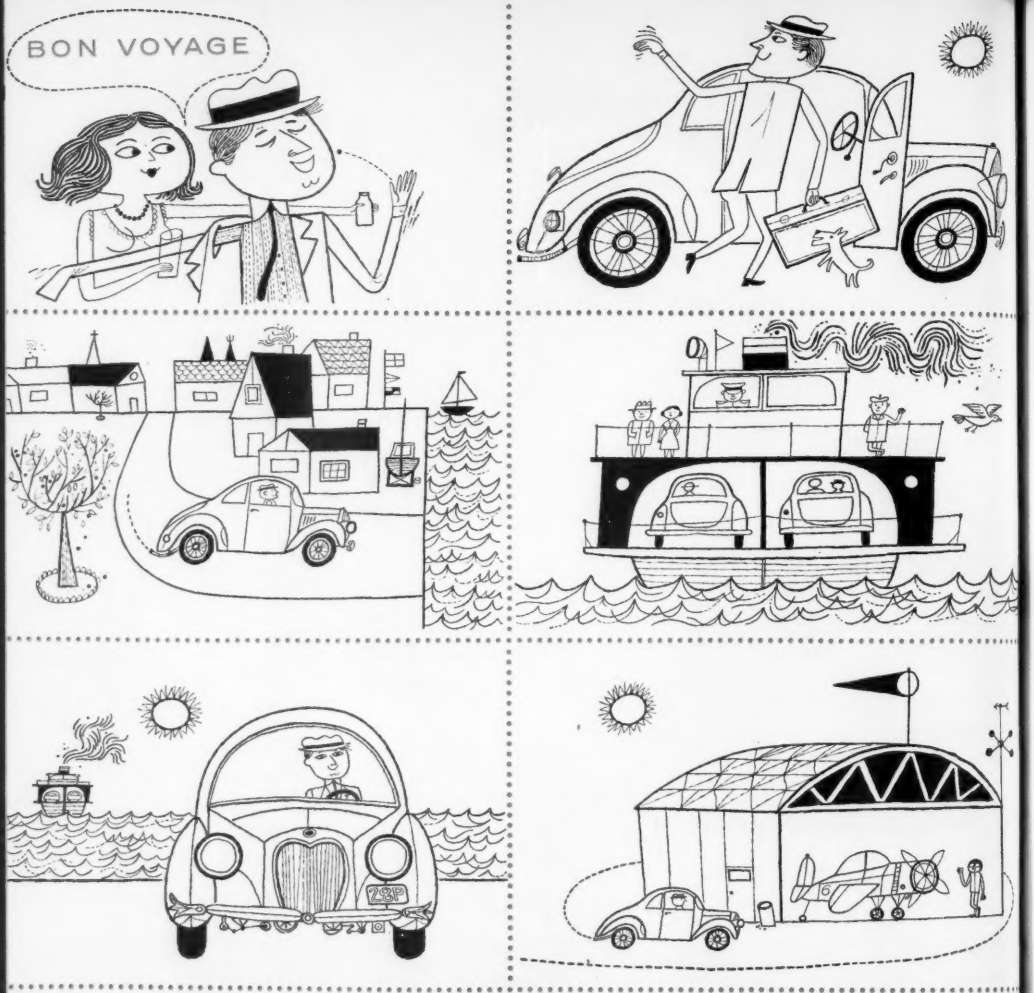

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BRAND OF MECLIZINE HYDROCHLORIDE

...the first motion-sickness preventive effective in a single daily dose

...prevents or relieves motion sickness due to all forms of travel

...available on prescription only for full physician supervision

Bonamine *is also useful in controlling the nausea, vomiting and vertigo associated with morning sickness of pregnancy, vestibular and labyrinthine disturbances, cerebral arteriosclerosis, radiation therapy and Menière's syndrome.*

Supplied in scored, tasteless 25 mg. tablets,

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Division, Chas. Pfizer & Co., Inc.

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"an effective antirheumatic agent"*

nonhormonal anti-arthritic

BUTAZOLIDIN®

(brand of phenylbutazone)

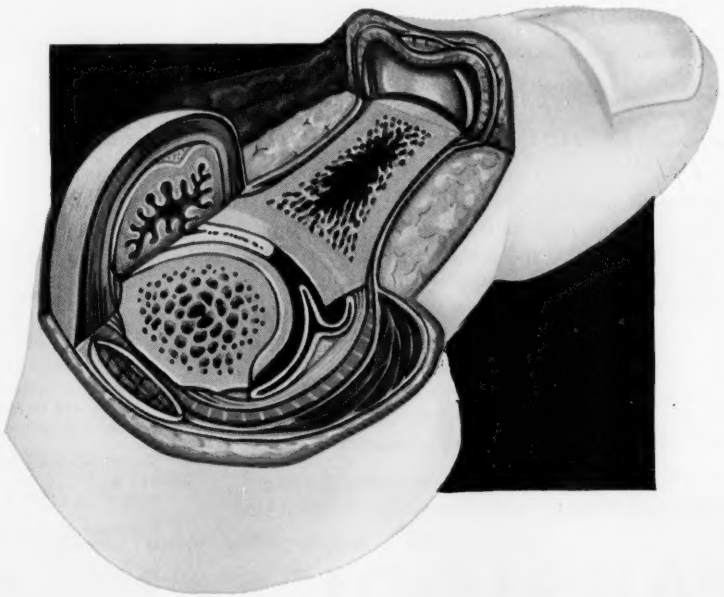
relieves pain · improves function · resolves inflammation

The standing of BUTAZOLIDIN among today's anti-arthritics is attested by more than 250 published reports. From this combined experience it is evident that BUTAZOLIDIN has achieved recognition as a potent agent capable of producing clinical results that compare favorably with those of the hormones.

Indications: Gouty Arthritis Rheumatoid Arthritis Psoriatic Arthritis
Rheumatoid Spondylitis Painful Shoulder Syndrome

BUTAZOLIDIN® (brand of phenylbutazone) red coated tablets of 100 mg.

*Bunim, J. J.: Research Activities in Rheumatic Diseases, Pub. Health Rep. *69*:437, 1954.



GEIGY PHARMACEUTICALS

Division of Geigy Chemical Corporation, 220 Church Street, New York 13, N.Y.

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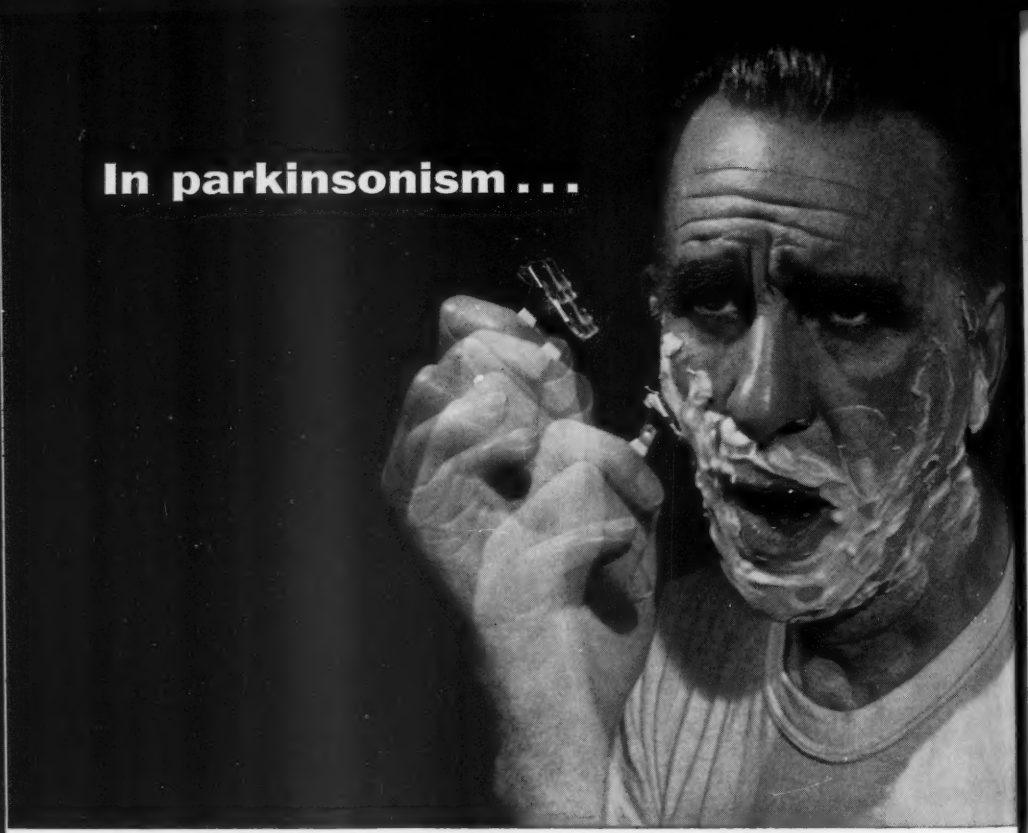

. . . a need to save face

Disheartened and debilitated – the parkinsonian patient is often unable to perform the simple functions of everyday life. To control his body, to handle a spoon, a razor, a glass; to live with dignity and strength – these are the goals he pathetically seeks.

A new drug, Parsidol, has successfully demonstrated its ability to modify or abolish the symptoms of Parkinson's disease.[1,2,3] Tremor, spasm, akinesia, oculogyric crises and festination have all been controlled in a significant number of cases.

Administered orally, either alone or with adjunctive therapy, such as atropine, scopolamine or stramonium.

Available in

10 mg., 50 mg. and 100 mg. tablets, bottles of 100 and 500. Trial supplies and complete information on Parsidol will be sent promptly upon request.

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113 W. 18th St.,
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1. Gallager, D. J. A., and Palmer, H.: New Zealand M. J. *49*:531 (Oct.) 1950. 2. Sigwald, J.: Presse méd. *59*:819 (Sept. 17) 1949. 3. Timberlake, W. H., and Schwab, R. S.: New England J. Med. *247*:98 (July 17) 1952.

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HYDROCHLORIDE

(Brand of Ethopropazine hydrochloride)

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PORTRAIT OF A JADED APPETITE . . .

When mealtime apathy is part of the clinical picture you see in geriatrics,

prescribe **TROPHITE®**

to stimulate appetite in the aged

Each tablet or teaspoonful (5 cc.) of 'Trophite' supplies: 25 mcg. B_{12}, 10 mg. B_1

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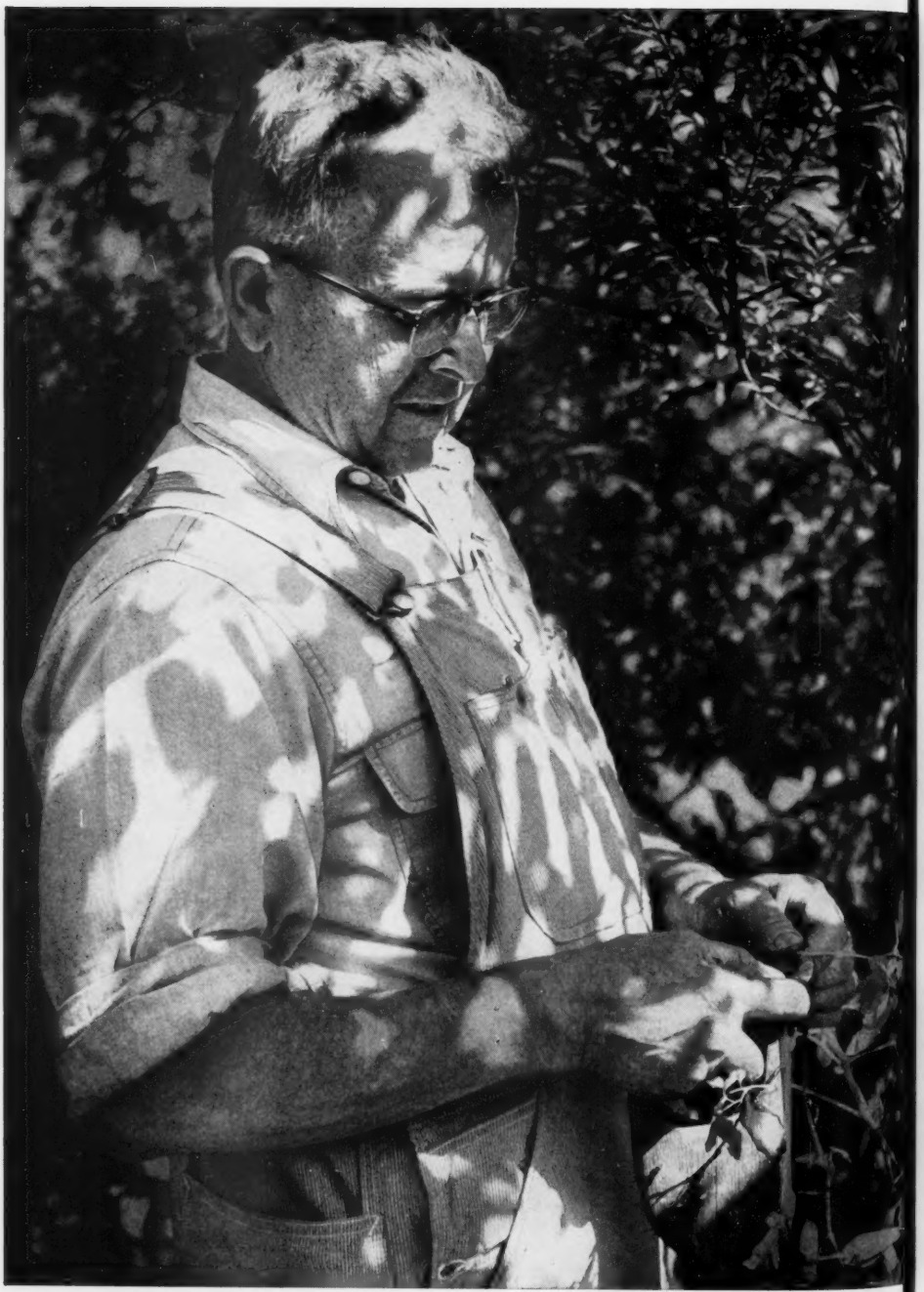

30A

"Gardening hard work? Not when you're in good shape!"

Physical fitness is enjoyed at any age, but during the later years it is especially coveted. GEVRAL supplies all the vitamins and minerals the older patient may need to continue feeling young at heart.

Gevral*

Geriatric Vitamin-Mineral Supplement Lederle

Each Capsule Contains:

Vitamin A	5000 U.S.P. Units	Choline Dihydrogen Citrate	100 mg.	Calcium (as $CaHPO_4$)	145 mg.
Vitamin D	500 U.S.P. Units	Inositol	50 mg.	Phosphorus (as $CaHPO_4$)	110 mg.
Vitamin B_{12}	1 mcgm.	Ascorbic Acid (C)	50 mg.	Boron (as $Na_2B_4O_7.10H_2O$)	0.1 mg.
Thiamine HCl (B_1)	5 mg.	Vitamin E (as tocopheryl acetates)	10 I. U.	Copper (as CuO)	1 mg.
Riboflavin (B_2)	5 mg.	Rutin	25 mg.	Fluorine (as CaF_2)	0.1 mg.
Niacinamide	15 mg.	Purified Intrinsic Factor Concentrate	0.5 mg.	Manganese (as MnO_2)	1 mg.
Folic Acid	1 mg.	Iron (as $FeSO_4$)	10 mg.	Magnesium (as MgO)	1 mg.
Pyridoxine Mononitrate (B_6)	0.5 mg.	Iodine (as KI)	0.5 mg.	Potassium (as K_2SO_4)	5 mg.
Ca Pantothenate	5 mg.			Zinc (as ZnO)	0.5 mg.

Other Lederle geriatric products include: GEVRABON *Vitamin-Mineral Supplement liquid with a wine flavor; GEVRAL PROTEIN Vitamin-Mineral-Protein Supplement powder; and GEVRINE* Vitamin-Mineral-Hormone capsules.

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first in advantages for low-salt therapy

DIASAL®

salt substitute of choice

for congestive failure
essential hypertension
obesity
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TASTE POUR-QUALITY APPEARANCE STABILITY	help keep patients on low-sodium diets
FREEDOM FROM UNPLEASANT AFTERTASTE	Keeps food attractive— prevents nutritional deficiencies
OPTIMAL POTASSIUM CHLORIDE CONTENT	avoids borderline hypopotassemia—makes DIASAL "...the product of choice for this purpose."*

DIASAL contains only potassium chloride, glutamic acid and inert ingredients...no sodium, lithium, or ammonium... and it is safe for prolonged use, both at the table and in cooking.

packaging: available in 2-ounce shakers and 8-ounce bottles. Send for liberal supplies of tasting samples and low-sodium diet sheets for your patients.

*Fremont, R. E.; Riverman, A. B., and Shaftel, H. E.: Postgrad. Med. *10*:216, 1951.

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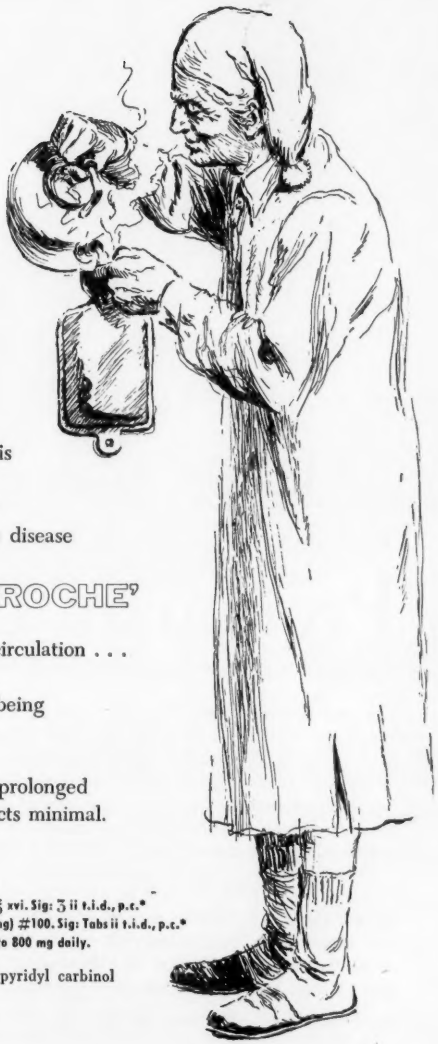

When the complaint is
cold hands and feet
and the diagnosis is
low-grade vasospastic disease

RONIACOL 'ROCHE'

improves peripheral circulation . . .
gives a feeling
of warmth and well being
to most patients.

Especially useful for prolonged
therapy . . . side effects minimal.

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RONIACOL TARTRATE Tablets (50 mg) #100. Sig: Tabs ii t.i.d., p.c.*
***may be increased as required up to 800 mg daily.**

Roniacol® — brand of beta-pyridyl carbinol

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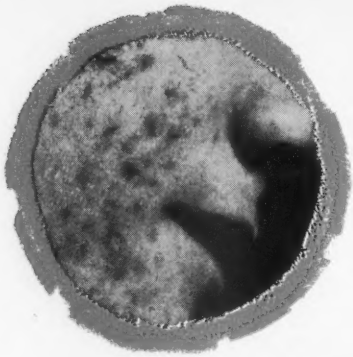
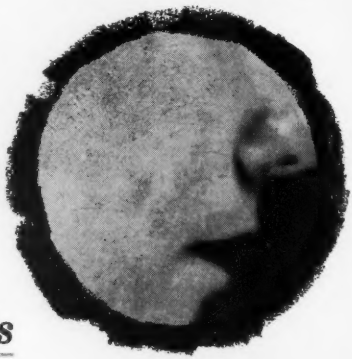


A 19 year old female with a 5 year history of cystic pustular scarring acne of face and back refractory to all other types of therapy.

After 12 weeks of treatment with "Premarin" Lotion applied to face only, remission is apparent. Untreated back remains unchanged.



Excellent results obtained in acne vulgaris

with "Premarin®" Lotion

Conjugated Estrogens (equine) for topical application

The case illustrated above is typical of the response obtained with "Premarin" Lotion in 70 to 80 per cent of patients of both sexes with refractory chronic acne of the cystic and pustular types.[1] "Premarin" Lotion was found particularly suitable because it provides concentration of medication at site of desired action; permits dosage control to eliminate possibility of side effects; and is esthetically acceptable to both male and female patients.

also effective in seborrheic alopecia

Within three to six weeks, control of scaling and itching and reduction of hair loss, particularly about the vertex of the scalp, were noted following application of "Premarin" Lotion, two or three times a day. No systemic effects were noted.[2]

Supplied: No. 875—Bottles of 60 cc. with applicator. Each cc. contains 1 mg. of estrogens in their naturally occurring, water-soluble conjugated form expressed as sodium estrone sulfate.

Detailed information available upon request.

1. Shapiro, I.: Postgrad. Med. *15*:503 (June) 1954; J. M. Soc. New Jersey *52*:6 (Jan.) 1955.

2. Shapiro, I.: J. M. Soc. New Jersey *50*:17 (Jan.) 1953.

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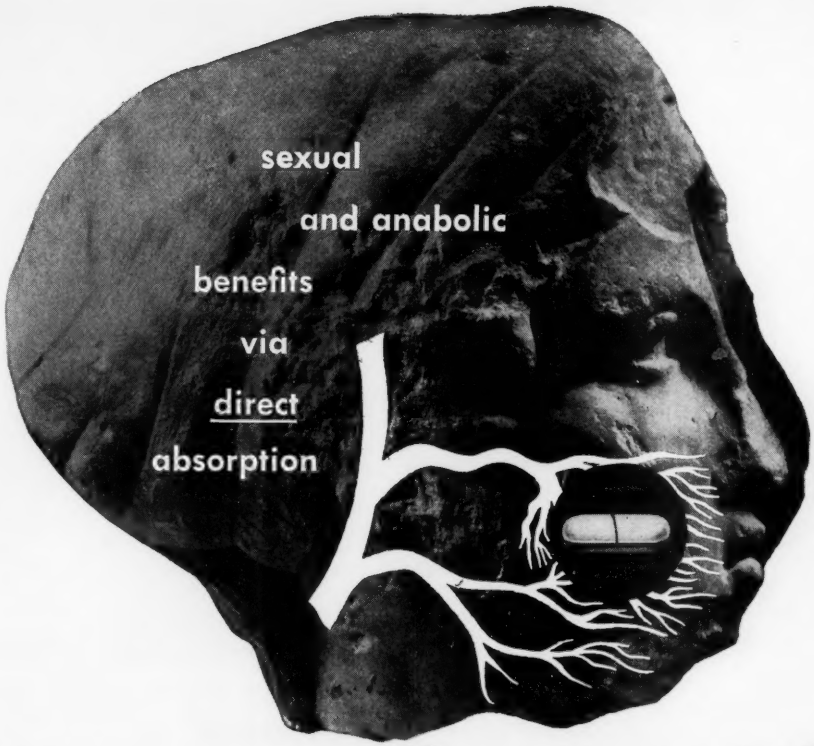

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the most potent oral estrogen with the most potent oral androgen

Buccally or sublingually absorbed LINGUETS by-pass liver inactivation or gastric destruction—are virtually as potent as parenteral steroids—provide effective, convenient, low-cost hormone therapy.

Supply: Metandren Linguets, 5 mg. (white, scored) and 10 mg. (yellow, scored). Femandren Linguets (green, scored), each containing 0.02 mg. ethinyl estradiol and 5 mg. methyltestosterone.

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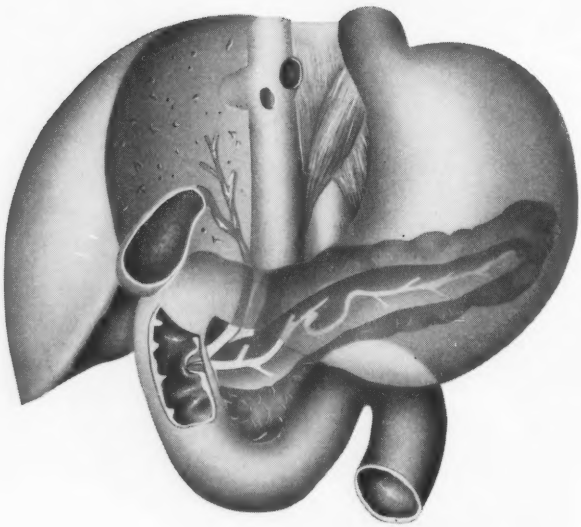
patients with liver and gallbladder disorders

*benefit from biliary flush**



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flushes liver stones into surgical zone, helps dislodge residual calculi, tends to prevent postcholecystectomy syndrome.

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Each tablet of *Decholin*/Belladonna contains *Decholin* 3¾ gr., and extract of belladonna ⅙ gr. (equivalent to tincture of belladonna, 7 minims).

* Complete information on Three-Day Biliary Flush available from your Ames Professional Service Representative – or write to Medical Service Department.

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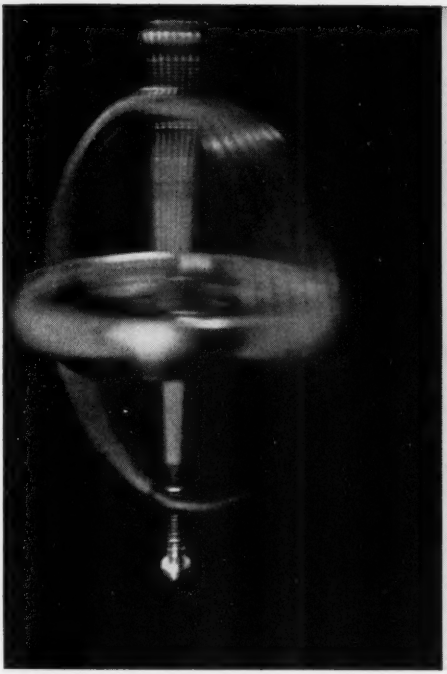

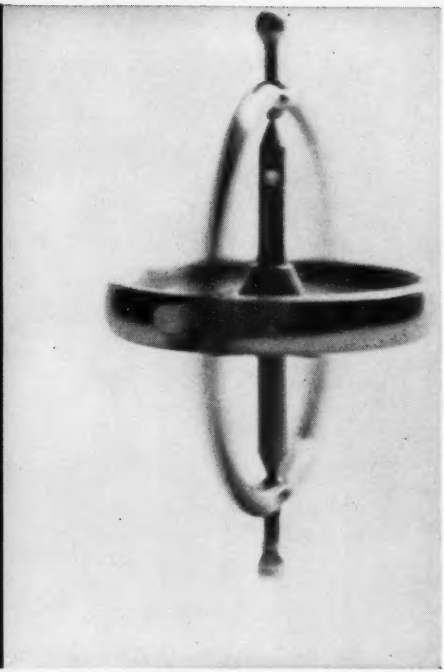

a stabilizing agent for the mentally or emotionally disturbed

Unlike the barbiturates, RAU-SED is not a hypnotic when given in proper dosage and will not diminish the patient's alertness. It may be effectively employed as a tranquilizer to relieve tension or anxiety in a wide variety of conditions.

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0.1 and 0.25 mg. tablets, bottles of 100 and 1000

0.5 mg. tablets, bottles of 50 and 500

1.0 mg. tablets, bottles of 30, 100 and 500

2 ml. ampuls for parenteral administration, each ml. containing 2.5 mg.

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ACE® FULL-FOOTED ELASTIC HOSIERY

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Because appearance counts, **ACE** Full-Footed Elastic Hosiery provides the style and smart look patients demand, as well as the therapeutic support their leg structures require.

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buttermilk therapy news

• "Intestinal flora can be changed either by administration of drugs or by modification of the diet."[1,2] Antibiotics, in particular, have been reported as markedly detrimental to a healthy intestinal flora and repeatedly as causative agents in diarrhea, acute ulcerative colitis, and inflammatory reactions involving the intestinal tract from the oral mucosa to the rectum.[3,4,5,6]

• Lactogenic diets "decrease the tendency to digestive complaints,"[7] and patients on antibiotic therapy have "almost completely controlled"[8] nausea and vomiting by the ingestion of dairy foods,[9] particularly buttermilk.[10]

• With oral antibiotic administration, "the complications are gastrointestinal. The best prophylaxis against this condition is to advise the patient to restock the intestinal flora..."[11] Cultured buttermilk has been reported, time and again, as an excellent dietary constituent for promoting better digestion.[10,12,13,14,15]

• "We found buttermilk preferable in infantile diarrhea, as compared with other milks."[16] Many researchers[17,18,19,20] concur in the opinion that acid milks such as buttermilk are an excellent source of healthy intestinal flora which promote normal digestion and elimination, especially in the presence of certain gastrointestinal disturbances.

• BORDEN'S BUTTERMILK is made by exacting standards with the same quality controls that are used in the processing of highly perishable fresh milk. Careful choice of starter and critical culturing time contribute to uniformity and pleasant taste (not overly acid) that characterize BORDEN'S BUTTERMILK.

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350 Madison Avenue, New York 17, N. Y.

Manufacturers and distributors of BORDEN'S Instant Coffee • STARLAC non-fat dry milk • BORDEN'S Evaporated Milk • Fresh Milk • Ice Cream • Cheese • Eagle Brand Sweetened Condensed Milk • BREMIL powdered infant food • MULL-SOY hypoallergenic food • BIOLAC infant food • DRYCO infant food • KLIM powdered whole milk

[1] J. A. M. A. 152:1676 (Aug. 22) 1953.
[2] J. A. M. A. 151:964 (Mar. 14) 1953.
[3] J. A. M. A. 152:585 (June 13) 1953.
[4] A. M. A. Arch. Int. Med. 90:677 (Nov.) 1952.
[5] J. A. M. A. 149:762 (June 21) 1952.
[6] A. M. A. Arch. Int. Med. 90:763 (Dec.) 1952.
[7] A. M. A. Arch. Int. Med. 90:677 (Nov.) 1952.
[8] J. A. M. A. 144:519 (Oct. 14) 1950.
[9] J. A. M. A. 142:1133 (Apr.) 1950.
[10] A. M. A. Arch. Dermatol. & Syphil. 67:173 (Feb.) 1953.
[11] Eye, Ear, Nose & Throat Monthly 31:647 (Dec.) 1952.
[12] Antibiotics & Chemotherapy 3:314 (Mar.) 1953.
[13] Am. J. Surg. 86:628 (Nov.) 1953.
[14] Delaware State Med. J. 25:55 (Mar.) 1953.
[15] J. A. M. A. 154:1392 (April 17) 1954.
[16] A. M. A. Am. J. Dis. Children 85:675 (June) 1953.
[17] A. M. A. Am. J. Dis. Children 84:757 (Dec.) 1952.
[18] Ann. Allergy 11:555 (Sept.-Oct.) 1953.
[19] New York State J. Med. 54:231 (Jan.) 1953.
[20] Med. Times 80:666 (Nov.) 1952.

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"Come down, Miss Phoebe! E&J means Everest & Jennings, not Engineless Jet."

By comparison, lightweight E&J chairs *do* seem effortless to maneuver. Patients enjoy the perfect balance and easy handling—also the "finger-tip" folding that makes an E&J so easy to carry in car. You can recommend an E&J with confidence.

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1. Kline, P. R., and Caldwell, A.: New York St. J. M. May 1, 1952.
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3. Kline, P. R.: Current News in Derm. & Syph., May 1952.

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1. Cass, L. J. and Frederik, W. S.: Malt Soup Extract as a Bowel Content Modifier in Geriatric Constipation. Journal-Lancet, 73:414 (Oct.) 1953.

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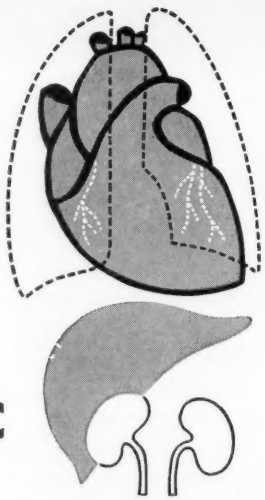

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Volume 10, Number 5 Geriatrics

Neuromuscular diseases of later maturity. Part I

GABRIEL A. SCHWARZ, M.D., and
GERALDINE KING, M.D.
PHILADELPHIA, PENNSYLVANIA

Many neuromuscular disorders have their onset in later maturity. Such conditions as myasthenia gravis, amyotrophic lateral sclerosis, thyrotoxic myopathy, idiopathic polymyositis and dermatomyositis, muscular dystrophy, menopausal muscular dystrophy, and carcinomatous myopathy are discussed with emphasis on diagnosis.

◆ Certain neuromuscular diseases may appear for the first time in later adult life, or may first become severe enough to prompt the patient to seek medical help. Many of these diseases have been thought of as having their onset confined to childhood or early adult life. Goöi.[1] in reviewing the problem of myasthenia gravis, stated that "very rarely does it begin after the age of 50 years." Muscular dystrophy is always considered a disease of childhood. Nevin[2] found 16 cases of late progressive myopathy recorded in the literature up to 1936 and added two of his own. However, amyotrophic lateral sclerosis and its associated syndromes have repeatedly been recognized as conditions more frequently beginning after 40.[3]

Certain of the neuromuscular diseases of later maturity may present somewhat different clinical features, prognosis, etiology, and therapy. For instance, Schwab and Leland[4] suggested that the age of onset of myasthenia gravis was later in males, that the course and prognosis was different, and that thymectomy might better be limited to females in whom the disease had started early in life. MacEachern and coworkers[5,6] suggested that wheat germ oil or cortisone may be of particular benefit in some of the geriatric myopathies.

Because of these varied clinical, etiologic, and therapeutic implications, it was felt worth while to emphasize the importance of this group of uncommon conditions. Certain difficulties can and do

GABRIEL ALEXANDER KING *is assistant professor of neurology and* GERALDINE KING *is assistant instructor in neurology in the School of Medicine, University of Pennsylvania.*

occur in the recognition and diagnosis of the neuromuscular diseases so that special studies may be required to delineate each one correctly. Although a differential diagnosis can usually be established, an awareness of the scope of the clinical features, of the chemical changes, of certain ancillary electrical tests, and of the pathologic histology of the neuromuscular diseases would seem essential for physicians engaged in geriatric practice. To this end, we have prepared this review and presentation of cases. We have included myasthenia gravis, amyotrophic lateral sclerosis, thyrotoxic myopathy, polymyositis, and progressive muscular dystrophy as being the principal neuromuscular conditions encountered in later maturity. Certain miscellaneous disorders—dystrophy of quadriceps, menopausal muscular dystrophy, and carcinomatous myopathy—are considered because of their increasing significance.

Myasthenia Gravis

Although myasthenia gravis is often thought of as a disease which begins in early adult life, some earlier reports[7,8] indicated that onset could occur in late adult life. Three of Goñi's 13 patients had their first symptoms at 69, 40, and 49 respectively—all were males.[1] Grob reported that the average age of onset of the generalized form of this disease was 28 years in women and 43 years in men.[9] Schwab and Leland also showed this apparent tendency for the disease to begin later in life in the male, for 25 per cent of their 165 males first manifested the disease in the seventh decade,[4] as shown in table 1. During the ten years from 1944 through 1953, 27 patients suffering from myasthenia gravis were admitted to the Neurologic Service of the University of Pennsylvania Hospital. Eight of these were males. Five patients had their first onset below the age of 20; 12, all females, between 20 and 30; 3, all males, between 30 and 40; 1 female at 46 and 1 at 60; the others, all males, at 47, 52, 59, 61, and 67. In this small group, the tendency of the disease to appear in later maturity in males is evident.

TABLE 1

Age group years	*Booth, 1908[7] (250 patients) per cent*	*Gerstle, 1929[8] (67 patients) per cent*	*Schwab and Leland, 1953[4] (367 patients)*	
			females per cent	*males per cent*
0-9	2.0	3.0	3.0	5.0
10-19	13.6	18.0	24.0	8.0
20-29	38.0	46.2	35.0	14.0
30-39	23.2	12.2	12.0	16.0
40-49	16.0	19.0	13.0	14.0
50-59	4.8	1.5	7.0	13.0
60-69	2.8	0.0	4.0	25.0
70-79	6.8	0.0	2.0	5.0

CLINICAL FEATURES

Myasthenia gravis is essentially characterized by a weakness of voluntary muscle which lessens with rest and increases with use. Any group of muscles may be involved. The disease often involves first the muscles of the eyelids, eyeballs, face, mouth or throat, then other muscle groups gradually. Spontaneous remissions and exacerbations make the course of the disease somewhat variable. Lasting muscle weakness inevitably develops; permanent paralysis and atrophy of muscle groups may come eventually. At times, the process may be limited to one group of muscles only and for a long time. This is particularly true of the extraocular muscles—so-called "localized ocular myasthenia gravis."[9] Indeed the disease process may be limited to only one eye.[10]

Case 1. W. L., a 63-year-old white male, was first seen on September 8, 1953. He had been in his usual good health until six days before, when, while driving his car on a long trip, he became aware that he was seeing double. The left upper eyelid drooped, a difficulty which persisted, although the severity of symptoms varied from time to time and the diplopia lessened. His wife noted that his left upper eyelid drooped less in the morning and seemed to get worse as the day went by.

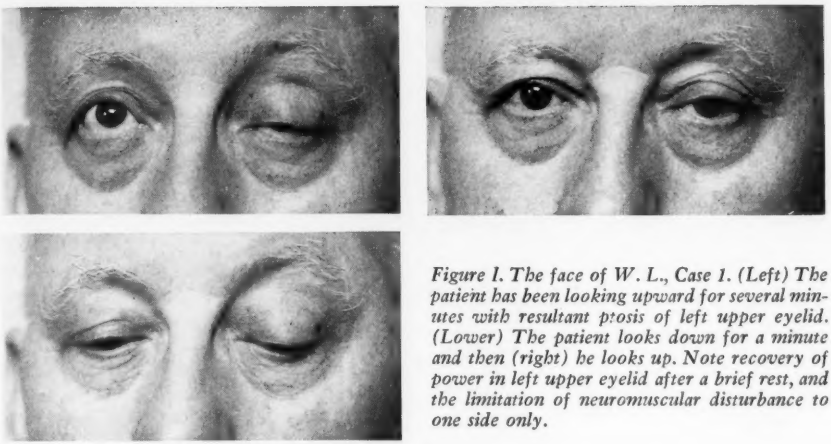

Figure 1. The face of W. L., Case 1. (Left) The patient has been looking upward for several minutes with resultant ptosis of left upper eyelid. (Lower) The patient looks down for a minute and then (right) he looks up. Note recovery of power in left upper eyelid after a brief rest, and the limitation of neuromuscular disturbance to one side only.

The neurologic examination revealed no abnormalities other than the changes noted about the left eye. The eyeballs moved fully. The left upper eyelid drooped so that it obliterated more than half of the palpebral fissure. When the patient was asked to look up or straight ahead, the left upper eyelid drooped progressively lower and lower. Then the patient was asked to keep his head still but look at the floor for several minutes. He was then requested to look upward or straight ahead again, and it was noted that the degree of the former ptosis had lessened and the upper eyelid was more fully elevated as shown in figure 1. However, if he continued to maintain this gaze, the ptosis developed again. This could be repeated over and over again. The ptosis did not bother him at work, chiefly because he had to look down almost constantly in his job and so did not fatigue the affected levator palpebrarum muscle.

The patient was given neostigmine hydrobromide 15 mg. q.i.d. and potassium chloride in a 25 per cent aqueous solution in a dosage of 1 dram t.i.d. The affected musculature was benefited by the medication, although the symptoms and signs were not fully abolished.

More commonly the disease will involve many muscles. Unusually, the onset may be quite abrupt, sometimes in association with an intercurrent infection which may help to confuse the diagnosis.

Case 2. M. C., a 61-year-old white woman, was admitted to the Neurology Service of University of Pennsylvania Hospital on September 23, 1949. On August 8 she had had a cholecystectomy under spinal anesthesia with an uneventful convalescence. On August 28, a sore throat developed and she suffered severe burning on swallowing any liquid. After several days, the pain subsided, but her jaws were weak and she had difficulty in chewing food. Swallowing became difficult, although she could swallow liquids if she took her time. Not long after this, she noted that she could talk well for about ten minutes, then her voice weakened and speech became jumbled. Her eyelids began to feel heavy and it was difficult to hold them open. Her head felt heavy and she had trouble holding it erect as it tended to fall forward. Legs were weak so that she held on to nearby objects when walking.

On admission, vital signs were well within normal limits. Gait was not abnormal and the Romberg test revealed no unusual swaying. There was no dysmetria, dyssynergia, or dysdiadokokinesia. There was no weakness of muscles of the extremities, nor any change in muscle tone or volume. No fasciculations were noted. All modalities of sensation were intact. All of the deep and periosteal reflexes were present and equally active and no pathologic reflexes could be demonstrated. The upper eyelids showed noticeable bilateral ptosis. Eyeballs moved fully and there was no nystagmus. Pupils were regular and equal and reacted well to light and in accommodation-convergence. The patient was unable to close her jaw with any degree of force and showed bilateral weakness of all of the face muscles. Swallowing was difficult and gag reflex was poor, although the sensation of the throat was intact. Speech was slurred. The sternocleido-mastoid and other neck muscles were weak, so that the patient held up her head with her hand.

Blood and urine were normal. Blood serum syphilitic tests were nonreactive. Skull and chest roentgenograms revealed nothing of significance.

The patient was given a subcutaneous test dose of 1.5 mg. neostigmine methylsulfate, and 0.6 mg. atropine sulfate and within fifteen minutes, a remarkable change occurred. She smiled freely, spoke clearly, and chewed up and swallowed a box of crackers.

The patient was put on a maintenance dosage of neostigmine hydrobromide in 15-mg. tablets—2 before breakfast each morning, 4 before the noon meal, 1 at 2 P.M., 4 before the evening meal, 1 at 7 P.M., and 1 at 4 A.M. She got along well on this dosage of 13 tablets a day.

When seen in September 1950, she required less of this medication. She got along with 1 tablet before each meal, 1 at 2 P.M., and 1 at 7 P.M. daily. Often she ate without medication.

DIAGNOSIS

The diagnosis of myasthenia gravis may be established by a number of special tests:

The *neostigmine test* consists in the administration of a test dose of this drug by three possible technics: (1) intramuscular injection of a solution containing 1.5 mg. neostigmine methylsulfate and 0.6 mg. of atropine sulfate;[11] (2) intravenous injection of 1 cc. of a 1:2000 solution (0.5 mg.) of neostigmine methylsulfate;[12] or (3) oral trial with one or more 15-mg. tablets neostigmine bromide. The intramuscular route seems to be the most satisfactory. This may give a dramatic response, as in case 2, and establish the diagnosis. Occasionally, no prompt effect occurs, as in case 1.

The *edrophonium chloride test* is also stimulatory,[13] but produces more rapid results because it can be given intravenously. Edrophonium chloride (Tensilon), 10 mg. or 1 cc., is injected intravenously. The affected muscles regain their power. Response is rapid, but the effect is said to be over in a few minutes, so that the test, with dosages of 1.5 to 2 cc., can be repeated in doubtful cases. In normal people, fasciculations of muscles may occur following administration of this drug, whereas no such change occurs in myasthenic muscles—this is felt to be a sensitive part of the test.

The *curare test* is based on the apparent particular weakening susceptibility of myasthenic muscle to this drug.[14] Standard curare principle, 1 mg. per kilogram of body weight given intravenously, was found to produce a mild generalized curarization in a normal adult. One-tenth of this dose is injected intravenously over a one-minute period in a suspected patient. Within two minutes, existing myasthenic symptoms are exaggerated and new weaknesses may appear. Within two to three minutes, the test is terminated by the intravenous injection of 1.5 mg. neostigmine methylsulfate with 0.6 mg. atropine sulfate.

The *quinine test* is based on the observation that this substance increases the weakness of myasthenic muscle and has a mild curarizing effect.[15] Quinine sulfate, 10 gr. or 0.6 gm., is given orally every two hours for 2 or 3 doses. Slight weakness may be increased or new weaknesses may appear. These are relieved by a subcutaneous or intramuscular injection of 1.5 mg. of neostigmine methylsulfate.

No other neuromuscular disease reacts in this manner to these two drugs—curare and quinine. These tests are of special value when the neostigmine test fails to give a response. A case was reported in which quinidine given for cardiac disease brought out a latent myasthenia gravis.[16] The *swallowing-neostigmine test* is a valuable adjunct when the muscles of deglutition are involved.[17] The patient is allowed to swallow thick barium paste. Roentgenograms after swallowing will show retention of the barium in the valleculae and in the pyriform sinuses. The patient is then given a subcutaneous or intramuscular injection of 1.5 mg. neostigmine methylsulfate and 0.6 mg. atropine sulfate. About twenty minutes later, further roentgenograms after repeating the swallowing test show little or no barium retention in the valleculae or pyriform sinuses (figure 2).

Electrical tests have a valuable place

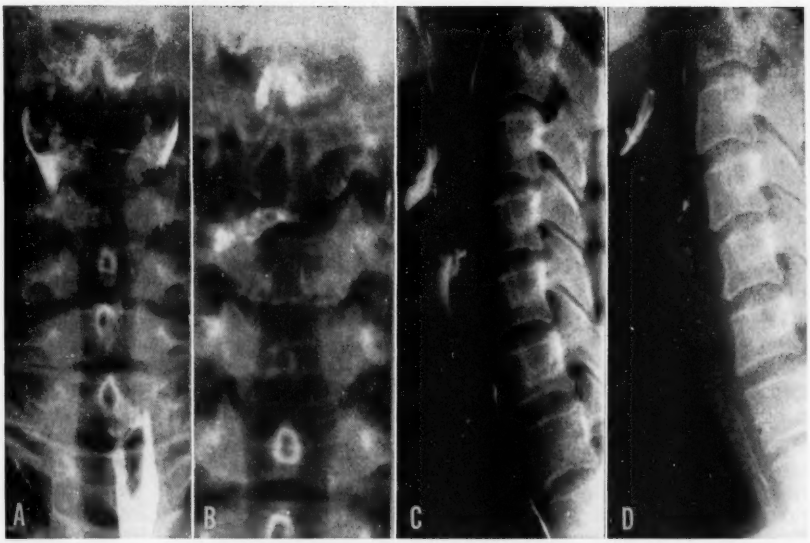

Fig. 11. Roentgenograms made during swallowing on a patient with myasthenia gravis. A. The barium is retained in the valleculae and pyriform sinuses. B. No retention occurs after administration of neostigmine. Anterior-posterior view. C and D. The same effects in lateral view.

in diagnosis of myasthenia gravis. The myasthenic reaction of Jolly was the earliest characteristic electrical disturbance noted in this disease. Using a faradic current or any other tetanizing current at a frequency of 70 to 80 per second, the affected muscle will show a lessening contraction as the current is continued for seconds to as long as two minutes. The time required to obtain the failure of contraction depends on the severity of involvement of the particular muscle being tested. Normal muscle maintains its tension under more prolonged stimulation at these frequencies. With even a brief rest, the myasthenic muscle contracts well again. The response to galvanic current is unaltered and the chronaxie remains unchanged.[18]

Using the electromyograph with the technic devised by Harvey and Masland,[19] characteristic changes can be obtained from myasthenic muscle. They recorded action potentials from a muscle made to contract by supramaximal stimulation of its motor nerve. In myasthenia gravis, such records have been obtained from the abductor digiti quinti,[20] the adductor pollicis brevis,[21] and the orbicularis oculi.[22] The significant change on repetitive stimulation of the motor nerve is a progressive decline of the action potential of the muscle. This change is also noted in neuromuscular block produced by such drugs as curare. The summated electromyogram of myasthenics may become indistinguishable from the normal following an adequate dose of neostigmine. Botelho and coworkers warn that, in any given case, frequency of stimulation should be tested at 3 per second and 25 per second for each muscle and various muscles should be tested to obtain the electromyogram characteristic of neuromuscular block.[21] Of more recent interest is the observation that the action potentials of myasthenic muscles were well maintained after intravenous admin-

istration of decamethonium iodide—2.5 mg. in divided doses—while in the normal muscle there was a marked fall in the action potentials following the use of this drug.[23]

TREATMENT

The treatment of myasthenia gravis has centered essentially on the relief obtained by the use of neostigmine, taken orally in 15-mg. tablets. The dosage must be adjusted to individual needs. Some patients may require as much as 30 or more tablets in divided doses throughout each twenty - four - hour period. At times, neostigmine has failed to relieve the weakness of affected muscles and, on rare occasions, has seemed to make the weakness greater.[24] Mild toxic effects of neostigmine — salivation, nausea, vomiting, diarrhea, abdominal cramps, sweating, bradycardia—may be relieved by tablets of 1/100 gr., or 0.6 mg. atropine, or 10 minims tincture of belladonna 2 or 3 times a day. At times, when the oral route is not feasible, especially in myasthenic crises, 1.5 mg. neostigmine methylsulfate may be given intramuscularly or intravenously.[25]

Ephedrine is not as beneficial as neostigmine, but has a more prolonged duration of action.[26] Occasionally, it may enhance the effect of neostigmine. It can be given in dosages of ⅜ to ¾ gr. twice daily. The stimulatory side effects may be controlled with small amounts of barbiturates.

Glycine—aminoacetic acid[27]— seems to possess little benefit in this condition.

Guanidine has been suggested as being of definite value.[28] As guanidine hydrochloride or guanidine carbonate, it may be given in gelatin capsules up to 2.5 gm. per day in divided doses of 150 mg. or more every four hours. This drug can also be given intravenously in the form of a 2 per cent solution of the hydrochloride in isotonic saline solution. The intravenous dose is about one-tenth the oral dose. The side effects of guanidine not only are like those of neostigmine but also can be abolished by atropine.

Potassium may help in some cases of myasthenia gravis.[29] While doses as large as 5 gm. every six hours may be required for any beneficial effect, the resultant nausea and diarrhea may preclude its regular use.

Di-isopropyl fluorophosphate,[30] tetraethyl pyrophosphate,[31] and hexaethyl tetraphosphate[32] are alkyl phosphates with strong anticholinesterase properties and have been tried in the treatment of myasthenia gravis. However, poor or inconstant responses, toxic manifestations, and intense side effects have made these drugs of doubtful value in the treatment of this disease.

Octamethyl pyrophosphoramide[33] has been found to offer more than any of the other anticholinesterase alkyl phosphates. In dosages of 9.5 mg. to 18 mg. in 1 per cent aqueous solution twice a day, this drug seems to give a smoother and more sustained, but no greater, effect than neostigmine. However, use of the drug is hazardous in patients who are taking neostigmine or who are severely affected,[34] so that the physician should be fully familiar with octamethyl pyrophosphoramide and its peculiarities before attempting to use it.

Edrophonium chloride (Tensilon) has been used in the treatment of myasthenia gravis[35] but it is given intravenously and has such an evanescent effect that it has little practical value. More recent work with edrophonium[36] has shown that it can help to differentiate a cholinergic crisis from a myasthenic crisis.

The value of thymic irradiation or thymectomy in myasthenia gravis remains unsettled.[37, 9] The recent data of Schwab and Leland[4] suggest that thymectomy may be the method of choice in young females.

The treatment of the grave crises of this disease requires all the ingenuity of the physician. No standard treatments

can be laid down. Early tracheotomy may be of great value. Spontaneous recovery may occur in these serious cases and should be worked for, inasmuch as another recurrence may be far off.

Amyotrophic Lateral Sclerosis

Charcot's disease is usually described as an illness of middle life[3] and its onset may occur in the sixties or seventies.

In a study of 111 cases of amyotrophic lateral sclerosis, Friedman and Freedman[38] found that the average age of onset was 52 and that men were affected twice as often as women. Lawyer and Netsky studied 53 cases clinically and pathologically and found that 28 of their patients developed the disease after 50.[39]

During the ten years from 1944 to 1953, 27 patients with amyotrophic lateral sclerosis were admitted to the Neurology Ward of the University of Pennsylvania Hospital. Five of them were Negroes, 22 were white. Fourteen were males, 13 were females. Two patients had their first onset between the ages of 20 to 29; 2 between the ages of 30 to 39; 8 between 40 and 49; and the others between 50 and 78. The majority had the onset of illness after 50. The youngest patient was 27 at onset of symptoms and the oldest, 78.

CLINICAL FEATURES

The classical clinical features of this disease include weakness, wasting, and fasciculations of voluntary muscles, especially the intrinsic muscles of the hands —indicating destruction of the motoneurons comprising the lower motor neurons of the brain stem and spinal cord —coupled with increased tendon reflexes, loss of superficial reflexes, appearance of certain pathologic reflexes, and spasticity or hypertonicity of striated musculature, especially of the lower extremities—indicating destruction of the pyramidal-extrapyramidal pathways in the spinal cord. The disease process may center chiefly on the motoneurons of the lower brain stem (progressive bulbar palsy or glossopalatolabial palsy), on the motoneurons of the spinal cord (progressive spinal muscular atrophy), or on the lateral pyramidal tracts (primary lateral sclerosis). When all of these areas are involved in variable degrees, the full-blown picture of amyotrophic lateral sclerosis appears.

The neurologic findings depend upon the stage of disease at the time of examination, and the amount of involvement of the various areas of the nervous system. In the series reported by Friedman and Freedman[38] the clinical evidence in 98 per cent of cases revealed involvement of the motoneurons of spinal cord or brain stem. In 25 per cent of their cases, no clinical indications of pyramidal-extrapyramidal system involvement were noted, yet this system was always found to be damaged at autopsy. Minor subjective sensory complaints were noted in 50 per cent, yet in only 10 per cent were any sensory signs elicited. The lower extremities were involved first in 38 per cent; the upper extremities first in 31 per cent; and the brain stem or bulb first in 21 per cent. The disease is steadily progressive. While it is true that in the beginning certain groups of muscles may be involved more severely, the advance of the disease invariably results in a more generalized weakness and wasting. Lawyer and Netsky[39] stated that onset with sensory complaints was not unusual, but that objective findings of sensory change were rare in this condition. In their cases, onset with symptoms in the lower extremities was twice as frequent as in the upper extremities. They stressed that the symptoms may remain in one limb or on one side for months, or rarely for years, before the inevitable classic symmetric wasting and weakness appear.

Case 3. C. S., a white female, age 64, was first seen on June 21, 1953. In August 1952, she had begun to have some weakness of her right lower leg. Her walking became gradually weaker until she could not walk unless supported. No

one knew when her left lower extremity became involved. Neither the patient nor her family were aware of any weakness or difficulty in use of the arms.

The patient had had some difficulty in talking and in swallowing, but the onset was not certain. The family had noted recently that when she sat up her head tended to fall forward.

Neurologic examination showed that her eyelids could be closed only weakly bilaterally. She could not gaze upward, although the eyeballs moved well in all directions. She could not blow up her cheeks, although she could move her lips. Speech was slurred and nasal. Gag reflex was readily obtained. Her tongue was atrophic and fibrillations were seen in the tongue muscles, yet the tongue could be protruded and moved about quite freely. The soft palate moved up fully.

Body and limb muscles showed generalized weakness, with weakness more noticeable in certain areas. The patient could turn her head fully, but the extensor muscles were so weak that her head fell forward when she sat upright. There was a footdrop on the right. The muscles of the right leg were weaker than those of the left. There was severe muscle atrophy which varied from one area to another. The wasting of the intrinsic muscles of both hands was especially evident in the muscles of the first interosseous spaces and thenar eminences. There was marked atrophy of the right tibialis anticus. Fasciculations were observed in the anterior muscles of the left thigh, the interossei, the muscles of the left forearm, the left biceps brachii, and so on. Sometimes these fasciculations could be noted after percussing the muscle. A myotonic response was observed in the left hand. When the patient contracted her left fingers firmly and was asked to extend them quickly, there was a delay in relaxation and carrying out the act. All muscles showed an intense myotatic response.

The sensory system was intact for all modalities of sensation. The deep and periosteal reflexes were equally hyperactive in the upper extremities. There were bilateral signs of Hoffmann. Abdominal reflexes were absent. Knee jerks and hamstring reflexes were hyperactive. The right ankle jerk was absent and the left was impaired. No pathologic reflexes were obtained in the legs.

Blood studies showed 81 per cent hemoglobin and 7,300 leukocytes per cu. mm.; blood urea nitrogen, 8 mg. per cent; and fasting blood sugar, 95 mg. per cent. Urine was normal. The blood Kolmer and Kline tests were nonreactive. Gastric analysis showed the presence of free hydrochloric acid. The cerebrospinal fluid was under a pressure of 60 mm. water, was clear and colorless, and contained 2 leukocytes per cu. mm. The protein of the cerebrospinal fluid was 44 mg. per cent. Kolmer test and colloidal mastic test of cerebrospinal fluid were nonreactive. The Queckenstedt test revealed no block of the spinal subarachnoid space.

Electric stimulation of the radial, ulnar, and median nerves produced a clinical myotonic response in the muscles of both hands, which lasted for one to five seconds. Chronaxie values for all of the involved muscles were elevated from 19 to 80 times the normal values. Electromyographic testing of the forearm flexor muscles produced occasional fibrillation voltages, bursts of fasciculatory potentials, resting motor unit potentials, decreased amplitude and frequency of voluntary muscle unit potentials, and a myotonic response lasting for fourteen seconds after the median nerve was stimulated at the elbow.

Roentgenograms of the skull and entire vertebral column revealed nothing of significance. Hypertrophic and osteoporotic changes were noted in the spine, but these were felt to be compatible with the patient's age.

The patient died suddenly on July 5, 1953, apparently as a result of inhalation strangulation. No autopsy was performed.

When the muscles of the limbs or trunk are involved first or predominantly, there is a tendency to consider this as the spinal form.

Case 4. H. W. R., a white male of 64, was first seen on June 10, 1953. About a year before, he had begun to notice a weakness of the right leg. This weakness progressed gradually so that he dragged his foot because of impaired dorsiflexion. Several weeks later, he became aware of a similar weakness of his leg and a partial drop of his left foot.

About six months later, some weakness appeared in the right hand, followed by loss of power in the left hand. Muscle volume of the right hand was reduced, especially in the first interosseous space on the dorsal aspect.

He had occasional fleeting cramps in the legs on arising in the morning. There were no subjective sensory disturbances. In the four months preceding examination, there had been a weight loss of 10 lb.

Neurologic examination showed a weak right orbicularis oculi muscle. The patient's cheeks were somewhat wasted, although he could whistle and blow out his cheeks quite well. Retraction of the corners of his mouth was done poorly —transversely rather than upward. The right masseter did not contract as fully as the left but the jaw opened in midline. Fibrillations were noted in the tongue. The other cranial nerves were intact. He had a left footdrop and weak-

ness of the left gastrocnemius and right tibialis anticus. Otherwise, muscle power was fairly good throughout. There was atrophy of the left tibialis anticus, of the left gastrocnemius, and of the muscles of the first interosseous spaces of both hands. Fasciculations were seen in various muscle groups, especially in the left biceps brachii. Myotatic response was abrupt and excessive in all muscles.

The sensory system was intact for all modalities. Deep and periosteal reflexes were exaggerated in both upper limbs and there were bilateral Hoffmann signs. Left abdominal reflexes were less active. Cremasteric reflexes were equally active. Knee jerks and hamstring reflexes were equally hyperactive. Ankle jerks were impaired, especially on the left. There was a suggestive sign of Babinski on the left, and bilateral signs of Chaddock.

Blood studies revealed a hemoglobin of 86 per cent; 4,660,000 erythrocytes per cu. mm.; and 9,000 leukocytes per cu. mm. of blood, of which 62 per cent were polymorphonuclear leukocytes, 37 per cent were lymphocytes, and 1 per cent were monocytes. Urine was normal The blood urea nitrogen was 11 mg. per cent and fasting blood sugar, 75 mg. per cent. The blood Kolmer test was nonreactive. The cerebrospinal fluid was under normal pressure, was clear and colorless, and contained 3 lymphocytes per cu. mm., 39 mg. per cent of protein, and 70 mg. per cent of sugar.

Roentgenograms of the lumbosacral spine showed minor demineralization and hypertrophic spurs along the articular margins which were felt to be usual for a person of that age.

Electric studies showed that all of the muscles of the left leg had chronaxie values from 50 to 130 times their normal value. Electromyography disclosed the voluntary motor unit potentials to be complex and of low voltage. At rest, spontaneous bursts of fasciculation voltages and occasional fibrillation potentials were obtained. Stimulation of the nerve proximal to the muscles produced myotonic contractions as shown in bursts of motor unit potentials.

The patient has shown a progressive weakness and wasting of limb musculature. Although active, he relies upon crutches to walk.

When certain cranial nerve nuclei are involved first or alone, it constitutes progressive bulbar paralysis or the bulbar type of amyotrophic lateral sclerosis.

Case 5. M. F. H., a white woman aged 73, was first seen on June 27, 1952. Five years before, the patient had begun to drool after having had her four last lower teeth removed so that she could have complete dentures. About a year later, she began to have trouble in eating, and a gradually progressive disturbance in swallowing and talking. When seen in 1952, she could drink nothing but milk with eggs beaten into it. Her speech was so poor that she had to comunicate by writing. There was some weakness of the left shoulder. She had lost much weight over the preceding five years.

The neurologic examination revealed no papilledema. Pupils were equal, regular, and reacted well to light and in accommodation-convergence. Eyeballs moved fully and there was no nystagmus. The lower jaw hung open, the lower lip drooped, and the saliva drooled freely and continuously. There was slight, yet definite, weakness of the left masseter muscle. Jaws opened in midline. There was definite weakness of the left orbicularis oculi muscle and bilateral weakness of the lower facial muscles, more noticeable on the left side. The patient was unable to whistle or purse her lips, but could retract the corners of her mouth slightly. She could make sounds although she could not talk. Her soft palate would go up on voluntary effort. The palatal reflexes were weak and gag reflexes were present. The tongue was atrophic and could not be protruded. There were fibrillations of tongue muscles. Both sternocleidomastoid muscles, both trapezii, the supraspinati, infraspinati, pectoralis major, and deltoid muscles were atrophied and very weak. All changes seemed to be more prominent on the left side, and the patient could not elevate or abduct her left arm. There was wasting of the left first interosseous muscle mass and fasciculations were seen in biceps, triceps, and forearm muscles.

Muscle power and volume were good in both lower limbs. Touch, pin-prick, vibration sense, and position sense were perceived well throughout. Left biceps reflex was weak, but right was hyperactive. The left triceps reflex was less active than that of the biceps, while the right was slightly hyperactive. Except for ankle jerks, the other deep and periosteal reflexes were hyperactive and equal. There were bilateral Hoffmann signs. A questionable Babinski sign was elicited on the left, but Gonda and Chaddock signs were positive on that side.

Laboratory studies showed a hemoglobin of 84 per cent. There were 8,900 leucocytes per cu. mm., of which 80 per cent were polymorphonuclears, 2 per cent eosinophils, 3 per cent monocytes, and 15 per cent lymphocytes. Blood urea nitrogen was 22 mg. per cent; fasting blood sugar, 96 mg. per cent; blood serum chloride, 103 mEq. per liter; serum sodium, 147 mEq. per liter; and serum potassium, 4.4 mEq. per liter. Serum total protein was 6.5 gm. per 100 cc. Urine showed a trace of albumin, a few erythrocytes, leukocytes, and hyaline casts. Kolmer and Kline tests were negative.

The chest roentgenogram showed a slight uncoiling and calcification of the aorta and a plate-like atelectasis at the right base. Lungs were felt to be emphysematous.

The patient was fed a high caloric gastrostomy feeding through a small polyethylene tube passed through the nose into the stomach. She tolerated this remarkably well and left the hospital with the tube in place. A paranoid psychosis developed and the patient expired on October 3, 1953—nearly six and a half years after onset of symptoms.

Although amyotrophic lateral sclerosis is almost always symmetrical in the end, unilateral involvement is not uncommon in the beginning. As the disease progresses, more and more muscles weaken and waste; finally reflexes are lost because no neuromuscular units remain to respond; and the patient becomes literally "skin and bone." The clinical picture varies somewhat depending at which stage one sees the case for the first time and which group or groups of muscles are chiefly involved by the pathologic process. Outstanding is the integrity of the sensory portion of the nervous system and the absence of signs indicating sensory disturbance.

DIAGNOSIS AND TREATMENT

The diagnosis of this disease rests upon the history of progressive weakness and atrophy of striated musculature; the neurologic findings of muscle weakness, atrophy, fibrillation and fasciculation; combined with increased reflex activity and the presence of pathologic reflexes. However, the disease process presumably may be limited to the lower motor-neuron, producing the related syndromes of progressive spinal muscular atrophy when the spinal cord is involved or progressive bulbar palsy or glossolabiopharyngeal palsy when the brain stem is involved. Under these conditions, no abnormality in reflex activity will be encountered until later in the disease when the reflexes are lost. Occasionally, the disease process may start out as a spastic hyperreflexic paraparesis because of the involvement of upper motor neurons—the syndrome of lateral sclerosis.

Electrical studies may help in diagnosis. Invariably, as the lower motor neurons are destroyed, the muscles so involved will show loss of response to faradism and a changing polar formula to the galvanic current. When the atrophy is more pronounced, all electrical responses are lost. More accurate information can be obtained from chronaxie studies which show an increased time value. The usual chronaxie is less than 1 millisecond, but in denervated muscle, this value is increased tremendously. The electromyograph affords even a better picture of the nerve-muscle status, for it indicates the presence of spontaneous asynchronous action potentials in the muscle undergoing denervation and degeneration. In some of our cases, we have noted myotonic response in the form of continuing action potentials from affected muscle after its nerve has been stimulated. This is not peculiar to amyotrophic lateral sclerosis, but has been reported as part of the muscle electrical picture in denervation.[40]

The treatment of amyotrophic lateral sclerosis is unsatisfactory. Wechsler felt that some favorable response was obtained from the use of vitamin E or large doses of the tocopherols.[41] Our experience has not confirmed this idea.[42] Present treatment is basically a matter of supportive treatment and good medical art. In the bulbar cases, in which swallowing has failed, we have found that a small indwelling nasal polyethylene tube may be tolerated for long periods and allow the patient to sustain nourishment.

Editor's note: Part two of this article will follow in the next issue.

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Lowering of serum cholesterol by ultraviolet irradiation

RUDOLF ALTSCHUL, M.U.Dr.
SASKATOON, CANADA

In cholesterol-fed rabbits, ultraviolet irradiation inhibits a rise in serum cholesterol and atheromatous lesions. Of 78 patients, mostly with vascular diseases, who were given single or multiple ultraviolet treatments, a significent number (61) showed a definite decrease in serum cholesterol. It is probable that this lowering of serum cholesterol may slow down the atherogenic process. In 16 out of 24 patients with hypertension, repeated irradiations were followed by a lowering of blood pressure.

◆ The element which is held by many to be responsible for the establishment of arteriosclerotic lesions is a functional failure of the vascular endothelium. For this failure there may or may not be a morphologic substrate.[1] Since the endothelial insufficiency is often constitutional and, even if acquired, can hardly be remedied directly, measures should be sought to prevent further damage. It is generally accepted that the atheromatous type of arteriosclerosis is brought about by a faulty cholesterol metabolism. If the insufficiency of endothelium is the primary factor, this disturbance plays only a secondary role, but if cholesterolemia is increased for a long time, even a normal vessel lining may suffer eventually.

Obviously, other things may damage the endothelium, such as high blood pressure or protracted toxemia. In any event, an endeavor should be made to eliminate the secondary noxious agent. This discussion will be limited to the lowering of serum cholesterol in patients with vascular diseases by means of ultraviolet irradiation.

In 1950 I reported that ultraviolet irradiation of pure cholesterol and especially of egg yolk reduced the atherogenic power of these substances in rabbits.[2] It was also found that direct irradiation of rabbits, which had received pure cholesterol orally during the experimental period, inhibited a rise in serum cholesterol and vascular and parenchymal lesions.[3] This inhibitory effect appeared to be related to the intensity of irradiation.

This led to a study of the effect of ultraviolet irradiation on serum cholesterol in patients with degenerative vascular diseases. Arteriosclerosis, if not advanced, has been considered as an indication for ultraviolet therapy, although I have never heard of a scientific reason for this treatment.

Method

In the present investigation, 78 patients were irradiated with ultraviolet light and serum cholesterol determinations were made before, after, and sometimes during treatment. The number of applications varied. The effect seemed to depend on intensity rather than on the number of exposures. When only one treatment was given, the intensity had to be pronounced in order to produce a definite effect.

Four groups of patients were irradiated

RUDOLF ALTSCHUL *is professor of histology at the University of Saskatchewan, Saskatoon.*

and a small group of young healthy adults to serve as controls (see table 1).

The *first group*, consisting of 29 patients who had been hospitalized for a short time, received only single strong doses of ultraviolet rays on the front and the back of trunk and limbs. The serum cholesterol was determined immediately before, and two hours and twenty-four hours after exposure.

The *second group*, consisting of 17 ambulant patients referred by local physicians, were given 12 treatments 3 times weekly for four weeks. Treatments were slight at first, starting with one to one and a half minutes to each side, and were increased slowly to twenty to twenty-four minutes, at 26 inches distance from the lamp. Serum cholesterol was tested before and after the sixth and twelfth treatments.

The *third group* consisted of 16 patients from a mental institution, mainly chronic schizophrenics. Of these, 13 received the same treatment as the patients in group II; 3 were irradiated only 6 times.

The *fourth group* consisted of 16 patients hospitalized for chronic diseases, mainly hemiplegia. Twelve patients received only single irradiations; 4 were irradiated 6 times.

Reports on the serum cholesterol after irradiation are contradictory. In normal patients, serum cholesterol is reported to rise after single ultraviolet exposures,[4-6] or to drop.[7,8]

In view of this lack of agreement, we gave 8 young adults, including one woman in the fifth month of pregnancy, tri-weekly ultraviolet irradiations for four weeks, using the same technic as that for group II. In one individual, the series were repeated.

Results

In the 8 normals, the serum cholesterol reactions during and after irradiation showed increases as well as decreases. The number of cases is too small and the results are too varied for statistical elaboration, but apparently there is no uniformity.

If the 4 groups of patients are considered together, the mean decrease of serum cholesterol is 8.9 per cent, with a standard deviation of $\pm$ 15.9 per cent, and a standard error of $\pm$ 1.8 per cent, and is therefore highly significant. The number of cases showing a decrease of serum cholesterol, 61 out of 78, is also highly significant.

The first group had the largest proportion of cases showing a decrease in serum cholesterol—26 out of 29—but the mean decrease of —14.2 was more pronounced in the second than in the other 3 groups.

In the third and fourth groups, results were less favorable; neither the reduction of cholesterol nor the number of patients showing a decrease was statistically significant, even though, in a majority irradiation was followed by a decrease in serum cholesterol. In the third and fourth groups, however, the mean age was much higher. The fact that the third and fourth groups had been hospitalized for long periods, also deserves attention. It is well known that individuals react differently to ultraviolet exposure. Decrepit[9] and old[6] persons respond with a less general reaction, which seems to be borne out by the difference in the cholesterol reactions of the first two and the last two groups under investigation, although some patients over 80 reacted with a definite decrease in serum cholesterol after exposure.

Blood pressure was studied in 24 hypertensive patients who received a series of 12 exposures. In 16, the pressure was noticeably reduced after treatment and, in several patients, subjective symptoms, chiefly headache and dizziness, were decreased or disappeared. These observations regarding an improvement in the hypertensive state are not new; they are discussed in more detail by Laurens[6] and Hall.[10] Because of the irreg-

TABLE 1

Patient	Sex	Age	Diagnosis	Serum cholesterol in mg. % before treatment	Serum cholesterol in mg. % after treatment	Per cent increase or decrease
			St. Paul's Hospital, Saskatoon, Saskatchewan			
Ke	M	63	Hypertension; coronary disease	205	178	−13.2
Sm	M	81	Hemiplegia; hypertension	201	182	−9.4
Lo	M	69	Coronary occlusion; arteriosclerosis	194	152	−21.6
Ro	M	56	Hypertension; congestive heart	247	231	−6.5
McN	F	68	Hypertension; intermittent heart failure	218	205	−6.0
Wi	F	73	Hemiplegia; hypertension	147	131	−10.9
Si	M	69	Hemiplegia; hypertension	264	229	−13.3
Bl	M	78	Coronary artery disease	135	127	−5.9
Fr	M	64	Coronary artery disease	317	303	−4.4
Zu	M	23	Hypertension; pheochromocytoma	225	208	−7.6
Pi	F	68	Hypertension	212	182	−14.2
A. Sm.	F	67	Diabetes; coronary artery disease	218	190	−12.8
Wa	F	74	Diabetes; hypertension	205	176	−14.1
Gr	F	27	Rheum. arthritis; hypochromic anemia	465	395	−15.1
Gr	M	59	Emphysema, cor. artery disease in ECG	178	117	−34.3
Ca	F	60	Coronary changes in ECG	257	203	−21.0
LaB	M	91	Coronary occlusion	225	236	+4.9
Wa	M	72	Hypertension	165	155	−6.1
Sch	M	63	Coronary occlusion	228	190	−16.7
Kr	F	42	Hemiplegia	227	165	−27.3
Le	M	73	Hypertension	196	117	−40.3
Ka	M	58	Coronary pulmonary artery disease	111	135	+21.6
Ka	F	65	Thyroidectomy; pulmonary fibrosis	268	244	−9.0
Go	F	69	Hypertension	272	244	−10.3
Sh	F	67	Hypertension; bronchial asthma	277	264	−4.7
Co	F	63	Coronary sclerosis	290	322	+11.0
He	F	68	Coronary artery disease	244	240	−1.6
Ol	F	52	Pulmonary fibrosis; bronchostenosis	268	253	−5.6
Li	M	69	Coronary occlusion	285	250	−12.3
			Laboratory of Gerontology, University of Saskatchewan			
Bo	F	43	Hypertension	225	173	−23.1
Si	M	54	Hypertension	168	158	−5.9
MacL	M	60	Hypertension	279	227	−18.6
Re	F	45	Coronary disease	198	166	−16.2
Gu	M	42	Hypertension	276	180	−34.8
Kn	F	59	Arteriosclerosis	334	372	+11.4
Sm	M	58	Hypertension	282	150	−46.8
We	F	74	Senility; parkinsonism	258	236	−8.5
Lei	F	62	Hypertension	249	192	−22.9
Ma	M	57	Hypertension; thoracoplasty	180	212	+17.8
Ne	M	64	Hypertension; hemiplegia	198	166	−16.2
Whi	F	44	Hypertension	238	176	−26.1
Chr	F	51	Hypertension	255	219	−14.1
Ha	F	51	Hypertension; bronchial asthma	206	237	+15.0
MacL	M	57	Hypertension	214	187	−12.6
Fi	M	48	Cholelithiasis	245	188	−23.3
Se	M	45	Coronary artery disease in ancestry	247	206	−16.6

TABLE 1 (continued)

Patient	Sex	Age	Diagnosis	Serum cholesterol in mg. % before treatment	Serum cholesterol in mg. % after treatment	Per cent increase or decrease
			Mental Asylum, Weyburn, Saskatchewan			
Ku	F	56	Schizophrenia	239	204	−14.6
Vo	F	66	Senile psychosis	276	303	+9.8
Ti	F	70	Hypertension	160	163	+1.9
Ba	F	63	Senile psychosis	223	183	−17.9
Ho	F	72	Senility; cerebral hemorrhage	190	174	−8.4
Re	F	74	Arteriosclerosis; arthritis	150	183	+22.0
Bu	F	72	Diabetes; arteriosclerosis	339	284	−16.2
Ha	F	74	Cerebral hemorrhage; acute bronchitis	157	225	+43.3
Str	F	75	Manic depressive	306	320	+4.6
Je	F	72	Schizophrenia	275	228	−17.1
Bu	F	74	Cerebral arteriosclerosis	298	255	−14.4
Ry	F	57	Schizophrenia	259	236	−8.9
Bo	M	67	Schizophrenia	152	153	+ .7
Ca	M	76	Hypertension	177	175	−1.1
Go	M	73	Schizophrenia	308	240	−22.1
Ar	M	61	Diabetic	204	159	−22.1
			Riverview Hospital, Windsor, Ontario			
Le	F	76	Hemiplegia	233	208	−10.7
Bo	M	89	Diabetes	223	195	−12.6
McM	M	67	Hemiplegia	182	125	−31.3
Gi	M	65	Diabetes	250	181	−27.6
Wr	F	70	Hemiplegia	200	181	−9.5
Ro	F	83	"	227	195	−14.1
Ba	M	58	"	250	210	−16.0
Fi	M	75	"	250	283	+13.2
De	M	69	"	265	278	+4.9
LeB	M	73	"	200	223	+11.5
Lw	M	69	"	173	160	−7.5
Dr	F	69	"	335	283	−15.5
Pi	M	73	"	167	227	+35.9
St	F	66	"	203	245	+20.7
Ba	F	84	"	223	213	−4.5
Co	F	90	"	260	195	−25.0

ularity of such results, the Council of Physical Therapy of the American Medical Association rejected this treatment in 1934.[11]

Discussion

At present, I can offer no explanation for the *increase* in serum cholesterol following ultraviolet treatment. Future investigations may help in understanding this reaction. The following observations seem to indicate that an increase of intravital oxidation may be the factor that causes the *lowering* of the cholesterol level:

1. Ultraviolet irradiation of cholesterol, in the presence of oxygen, causes oxidation of cholesterol.[12] Such treatment of cholesterol or egg yolk inhibits their atherogenic effect when fed to rabbits.[2]

2. Ultraviolet produces *in vivo* peroxide and HO radicals which oxidize the surrounding tissue.[13]

3. The observation that oxycholesterol will form following ultraviolet irradiation suggests the influence of light on the skin. Perhaps the same change may be caused by oxidative cell activity.[14]

4. A failure of respiratory enzymes is the cause of arteriosclerosis.[15,16]

5. Niacin, a respiratory coenzyme, decreases the serum cholesterol if fed to or injected in rabbits.[17]

6. Thyroxin increases oxidation in tissues, especially in the liver.[18] This view may explain why the serum cholesterol is low in many cases of hyperthyroidism, whereas in hypothyroidism it is increased.

7. An adequate oxygen metabolism is required for preventing the development or arresting the progress of arteriosclerosis.[19]

8. Repeated subcutaneous injections of oxygen in alcoholics are followed, in most cases, by a decrease in blood cholesterol.[20]

9. Increased oxygen tension in inhaled air inhibits the experimental cholesterol arteriosclerosis in rabbits and reduces the serum cholesterol in a majority of human subjects.[21]

Assuming that this theory—that ultraviolet irradiation causes or enhances oxidation of cholesterol—is correct, it still remains to be explained why this process should prevent atherosclerosis, at least in animal experiments. There is no final answer at present, but it may well be that oxycholesterols, after excretion by the bile into the intestine, are less readily reabsorbed than pure cholesterol.

The mechanism of the reduction of hypertension by ultraviolet treatment is not clear. Possibly the cutaneous vasodilatation is responsible, but the decrease of blood pressure outlasts the hyperemia. Hypertension is often accompanied by hypercholesterolemia[22] and therefore a reduction of the latter may influence the blood pressure. This appears plausible in the light of statements that cholesterol sensitizes the vessel wall for hypertensive substances, mainly for adrenalin.[23,24] In several cases in our series, however, blood pressure was reduced and subjective symptoms ameliorated, although the serum cholesterol had risen after irradiation.

It appears clear that the influence of ultraviolet irradiation on serum cholesterol and on hypertension will require further study. In our small series there were only 6 diabetics, but each responded with a marked decrease of serum cholesterol after irradiation. Future investigations may make it possible to select those patients who can be expected to have a good response to therapy and to submit less promising patients to other types of treatment. Such differences in reaction may be based not only on the kind of disease involved and on the general health of the patient, but also on neurovegetative and endocrine functions. The latter influence is suggested by the statements of Ellinger[25] and of Laurens,[6] both of whom have stressed the role of thyroid activity in the individual response to ultraviolet exposures.

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I wish to thank the Burdick Company for the donation of an Ultra-Lux lamp for our work. I also wish to thank I. H. Herman, M.D., Saskatoon; the laboratory staff of St. Paul's Hospital, Saskatoon; Ian Clancey, M.D., clinical Hospital, Saskatchewan Hospital, Weyburn; and the medical staff of Riverview Hospital, Windsor, Ontario, for their great help in carrying out these investigations.

(References, omitted because of lack of space, will be found in the authors' reprints.)

An outline of the newer methods of study of atherosclerotics

With emphasis on the 80-100 year group

HAROLD B. EIBER, M.D., A. ALLEN GOLDBLOOM, M.D., OTTO DEUTSCHBERGER, M.D., IRVING CHAPMAN, M.D., and WALTER R. LOEWE, M.D.

NEW YORK CITY

◆ The diagnosis of "atherosclerosis" cannot be made definitively if the previously accepted, outdated criteria of diagnosis are employed. This study of 650 patients over a period of four years was initiated in an attempt to determine which laboratory and clinical criteria are helpful to the physician in his study of atherosclerosis.

There have been few publications, until seven years ago, concerned with the patient past 80. This presentation embraces the newer clinical and laboratory approaches for the study of atherosclerosis in the aged. There appears to be a "Threshold" age from 60 to 70 years during which certain biochemical and physical processes reverse.

Diagnostic Methods

Four hundred patients of varying groups from 25 to 100 years were studied with special emphasis on their blood lipid determinations. Roentgenograms of 650 patients were reviewed, employing different criteria of diagnosis. An intensive survey was made of 75 patients, considered to be "normals," aged 80 to 100 years, with no previous histories of diabetes, coronary, metabolic, endocrine, or venereal disease. A brief summary of the diagnostic methods used, with findings, are outlined in table 1, page 220.

All five authors are members of the staff of the Bird S. Coler Memorial Hospital, a division of New York Medical College, Flower and Fifth Avenue Hospitals, New York City. HAROLD B. EIBER *is instructor in medicine;* A. ALLEN GOLDBLOOM *is clinical professor of medicine;* OTTO DEUTSCHBERGER, *assistant clinical professor and roentgenologist;* IRVING CHAPMAN, *pathologist; and* WALTER R. LOEWE, *attending ophthalmologist.*

BLOOD CHEMISTRIES

Blood chemistry tests were performed on a series of 400 patients. Cholesterol and phospholipid values showed no significant variation in any age group, but it was found that total lipids decrease significantly after the "Threshold" age group of 60 to 75 years. Procedures and findings are illustrated in figures I and II.

Creatinine and nonprotein nitrogen values show no significant variations in any age group. C-14 labeled cholesterol studies are inconclusive to date concerning factors involved in formation of atheromatous lesions.

There are no characteristic abnormalities of the blood counts in healthy individuals over 60. There is a tendency for the older person to show a slight average decrease in the red blood cell count and percentage of hemoglobin. However,

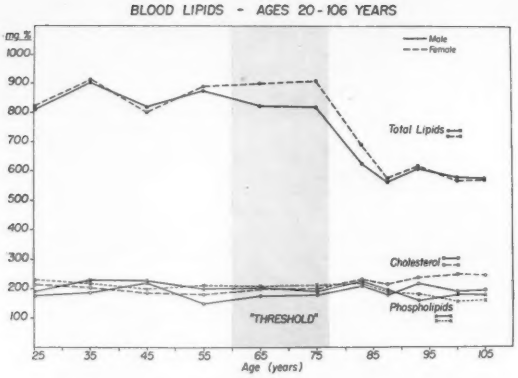

FIG. I. *Cholesterol values, except for an insignificant rise in the older female group, show no significant variations in any age group. Phospholipids values show no variation. Total lipids decrease significantly after the "Threshold" age group of 60 to 75 years. There is no difference between male and female groups. High cholesterol values do not imply gross existing atherosclerosis.*

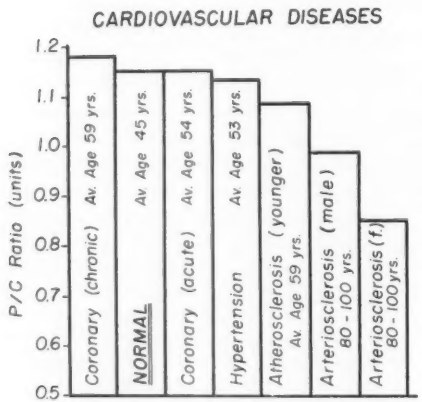
CARDIOVASCULAR DISEASES
P/C Ratio (units)
Coronary (chronic) Av. Age 59 yrs.
NORMAL Av Age 45 yrs.
Coronary (acute) Av. Age 54 yrs.
Hypertension Av Age 53 yrs.
Atherosclerosis (younger) Av. Age 59 yrs.
Arteriosclerosis (male) 80-100 yrs.
Arteriosclerosis (f.) 80-100 yrs.

FIG. II. *Abnormal ratios of phospholipids to cholesterol may occur when one component is altered disproportionately in comparison to the other component. One cannot assume that atherogenesis is more pronounced in the aged because of a P/C ratio below 1.00, compared to 1.10 in the younger individual. The P/C ratio is not constant and ratios below 1.00 cannot always be considered suggestive of overt vascular disturbance nor as an index of atherogenesis.*

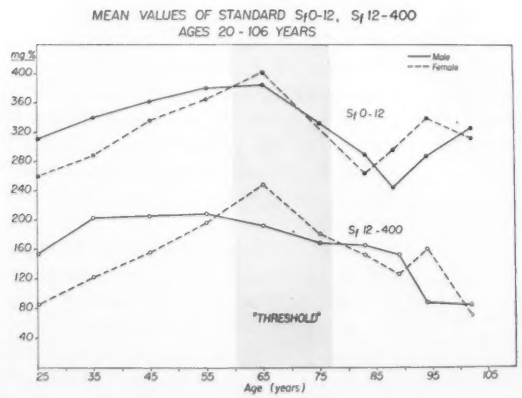

FIG. III. *The Sf 0-12 and Sf 12-400 classes of lipoproteins rise from age 25 until the "Threshold" is attained, and then there is a reversal of trends. No previous correlated studies in the 80 to 100 year group are available for comparisons. Serum lipoprotein determinations do not demonstrate any correlations with serum cholesterol values.*

this is not below the minimal normal for younger persons.

LIPOPROTEINS

By utilizing a highly specialized self-contained ultracentrifuge apparatus, it is possible to record automatically, at repeated intervals, the particle size or molecular weight of serum lipoproteins, by virtue of refractive gradients. The so-called standard classes of serum lipoproteins are the Sf 0-12 and the Sf 12-400. These classes were elevated in frank coronary groups. It was maintained that, until the age of 60, the elevation of these classes was in agreement with the finding that severe atherosclerosis does not inevitably accompany chronological aging. Hence, after many years, we had at our disposal a method and apparatus for the possible prognostication and diagnosis of atherosclerosis. Figure III illustrates some divergence with this view.

Electrophoresis

One purpose of the investigation was to determine whether the rise in beta-globulin in aged patients' sera was related to the increased level of specific macromolecular lipoprotein components. The beta-globulin fraction contains an appreciable percentage of serum lipids bound in the form of beta lipoproteins. Some correlations between electrophoretic studies and ultracentrifuge results were therefore sought. The moving boundary electrophoresis, although one of the most discriminating analytic tools of the biochemist, is not pure. It is a costly, large apparatus and requires skilled supervision. The extreme simplicity of the apparatus required for the electrophoretic separation of serum proteins on filter paper makes it possible for such a specialized diagnostic tool to be used more frequently and economically. In contrast to the classical moving boundary technic, the paper-strip method makes it possible to obtain information on protein and lipid distribution. Two typical studies are illustrated in figures V and VI on page 216.

The Atherogenic Index

An ideal compendium of the pertinent information on lipoproteins would be a single number descriptive of an individual's atherogenic potentialities. This is the atherogenic index (figure IV), and is derived from the following formula:

$$AI = \frac{\text{mg. \% standard Sf 0-12} + 1.75 \times \text{mg. \% standard Sf 12-400}}{10}$$

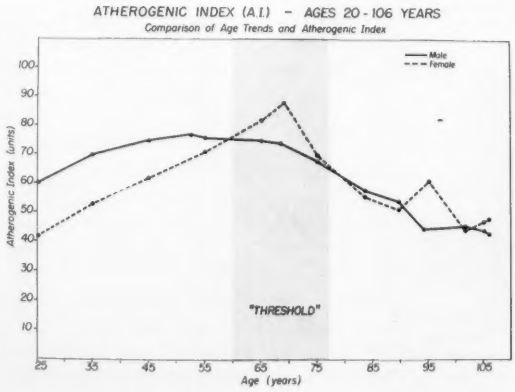

FIG. IV. *The mean values of the atherogenic index are lower in the younger group, with a gradual rise until the "Threshold" is attained, followed by a decline until age 100 is reached. The mean atherogenic index value for normal 80 to 100 year olds, male and female, is 55 units.*

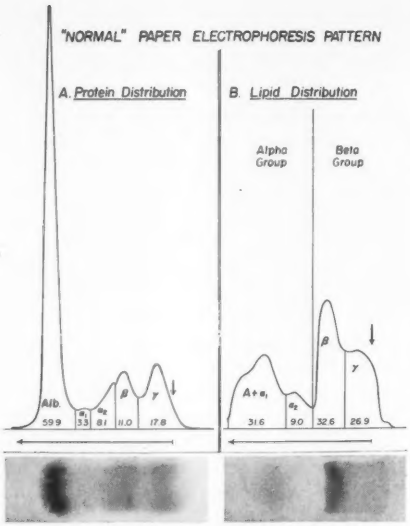

FIG. V. *Normal paper electrophoresis pattern. Protein pattern normal. Sixty per cent lipids in beta fraction; 40 per cent in alpha.*

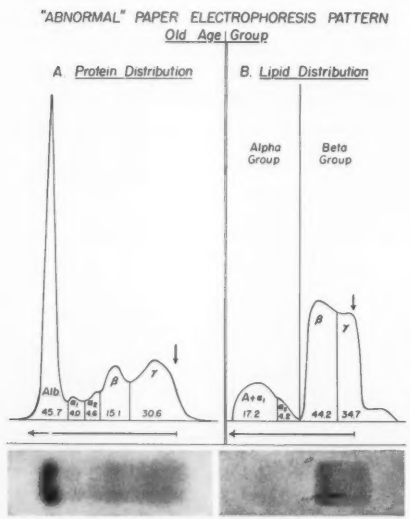

FIG. VI. *Abnormal pattern. In protein distribution, gamma high, albumin low; an abnormal shift in beta lipids. Eighty per cent lipids in beta fraction; 20 per cent in alpha.*

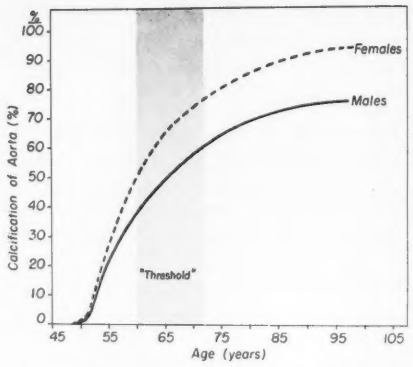

FIG. VII. *Calcification of the aorta progresses with age more rapidly in females than in males. There is a sharp rise from age 50 until "Threshold," then tendency to flattening.*

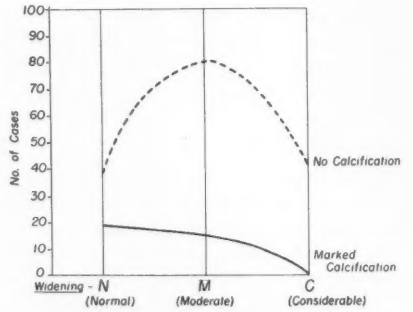

FIG. VIII. *Relation between widening and calcification of thoracic aorta in 400 patients.*

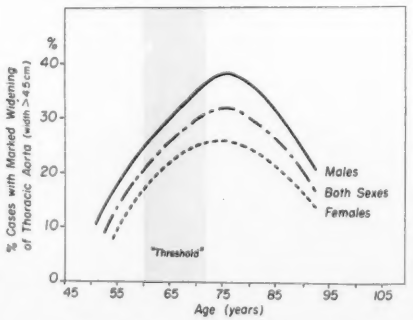

FIG. IX. *Marked widening of the aortic arch is never associated with marked calcification.*

X-RAY STUDIES

The roentgenograms of 650 patients were surveyed for calcification of the thoracic and abdominal aortas. Posterior-anterior views and lateral views were studied and measured. Routine chest films of patients aged 50 to 100 years were charted and the findings are shown in figure VII.

Marked differences in width of aortic knob (figure VIII) were classified as:

1. Normal width: 3 cm. for females; 3.2 for males.
2. Moderate widening: 3 to 4.2 cm. for females; 3.2 to 4.5 cm. for males.
3. Marked widening: greater than 4.2 cm. for females; 4.5 cm. for males.

It appears that the curves obtained from the serum lipoprotein classes and the atherogenic index do not coincide with the curve of calcification incidence as accurately as they do with the incidence of aortic dilatation. Of the 650 patients aged 60 to 100 years, 50 per cent of the males and 70 per cent of the females showed calcification. In the 80 to 100 year group of 225 patients, 65 per cent of the males and 89 per cent of the females had calcification of the thoracic aorta. The abdominal aorta calcification in this group, as revealed by preliminary study, showed approximately 75 per cent incidence of calcification, with females somewhat higher than males. Widening of the arch is illustrated in figure IX.

Typical x-ray findings, in patients 80 to 100 years who demonstrated noticeable declines in the serum lipoprotein classes and blood lipid values, are shown in figures X, XI, and XII.

ELECTROCARDIOGRAMS

A gradually increasing sclerosis of the coronary vessels occurs as part of the normal aging process. Some changes not acceptable or normal in the young adult may be so considered with advanced age. No hard and fast rule can be laid down as to what can be called normal or abnormal in the aged. There is no characteristic electrocardiographic tracing of

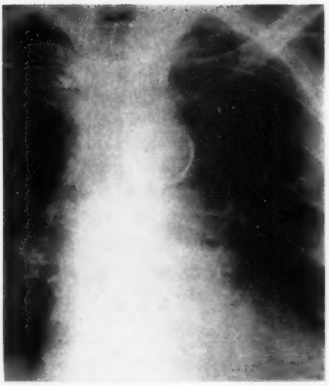

FIG. X. *Marked calcifications in wall of thoracic aorta associated with widening of lumen. An increase in size of left ventricle.*

FIG. XI. *Dense calcific plaques in wall of abdominal aorta and calcification of iliac arteries.*

FIG. XII. *Both femoral arteries and branches show marked calcification.*

old age. Electrocardiograms of 500 patients 80 to 100 years reveal that 71 per cent of the older group were within normal limits. Almost all showed some degree of left axis deviation. Twenty-nine per cent were abnormal, with right bundle branch block in 11 per cent, conduction disturbances in 7 per cent, old infarctions in 5 per cent, left ventricular strain in 3 per cent, and miscellaneous abnormalities in 3 per cent.

Ballistocardiogram

The ballistocardiograph registers body movements produced by the projection of the instantaneous spatial vector along the head-foot axis and performs according to the law of vibration mechanics. Recording technics, which are still far from perfect, produce curves which are merely the result of the harmonic vibration of the human body, on which are superimposed the motions produced by cardiovascular forces. The technics, as used in the aged, are greatly open to criticism because of many factors, such as rigidity, fear, inability to relax completely, and bodily distortions so common in the elderly. The distortion of the ballistocardiogram by extracardiac forces—chiefly aortic rigidity—is noticeable in the aged. Less than 20 per cent of our records were within normal.

EYE STUDIES

Despite normal blood pressure readings, all patients revealed moderate to advanced arteriosclerotic changes of the retinal vessels. These patients may have had some intermittent periods of hypertension, thus having an irreversible change in the retinal vessels similar to that of a hypertensive. Having survived these crises, the patients have been able to carry on with diminishing blood pressure tension values without incurring other retinal pathology.

The tortuosity of the retinal vessels appear first in the periphery. As the degree of arteriosclerosis progresses, tortuosity becomes more evident in the vessels near the optic disk. The degree of arteriosclerotic changes in the retinal vessels may be classified as follows:

\+ Tortuosity at the extreme periphery of the vessels.

\++ Tortuosity starting two disk diameters from the nerve head, small discrete exudates and hemorrhage. There is some indentation of the crossing vessels.

\+++ Tortuosity of all the vessels of the retina, with marked indentation where vessels cross; larger exudates and hemorrhages, extending throughout the retina.

\++++ Similar to +++ with closure of several vessels. There are areas of atrophy, pigmentation, and hemorrhage. Changes in the optic disk, with varying degrees of papilledema.

PATHOLOGIC STUDIES

The changes seen in the aorta and coronary arteries are those which had been characteristically described by many authors as occurring in arteriosclerosis. This term is being used generically without entering into the problem of the primacy of intimal or medial lesions, of elastic tissue degeneration, of lipid imbibition, or ground substance alteration.

In the aorta, one finds varying degrees of thickening of the intima by fibrous connective tissue, splitting and hyperplasia of the internal elastic membrane, and "mucoid" degeneration of the intima, most frequently in its deeper layers. Frequently, comparable changes were present in varying depths of the contiguous media. Also seen was a diminution in metachromatic substance in these areas of the intima and media as well as cholesterol clefts, lipid globules, and calcification. Stippled calcifications were frequently present in the media. In occasional sites, clusters of foam cells were noted in the superficial portions of the intima. Interestingly enough, they were most prominent in our cases with the lowest atherogenic index.

The coronary artery changes were also qualitatively similar to those seen in the 50 to 80 year old group, but they were much more severe. These changes are similar to those noted in the aorta—the one difference being that the media and internal elastic membrane were frequently bulged and thinned by the underlying arteriosclerotic process rather than being involved by degenerative changes as in the aorta.

There was no correlation of the pathologic findings with those of the clinical laboratory. Good correlation with roentgenogram findings was present. However, the difference between medial and intimal calcification cannot be differentiated on x-ray examination as shown in figures XIII and XIV.

Conclusions

From a practical point of view:

1. Do we gain any real knowledge or clinical aid from blood lipid studies?

Answer: Blood lipids contribute little as an aid in diagnosis and prognosis. The total lipids are low in the older group; cholesterol, phospholipids and the P/C ratio are statistically inconclusive.

2. Serum lipoproteins—are their values of any aid?

Answer: This may be argued both ways. A low lipoprotein atherogenic index value may represent current rate of atherogenesis or previously existing atherogenesis, in the older age group. They are not, at present, of any practical value as a laboratory aid in the older group.

FIG. XIII. *(right). Aortic arch and thoracic aorta demonstrating severe arteriosclerosis with marked "atheromatous" ulceration. This patient is typical of a large group of 90-year-old individuals who had low blood lipids, low serum lipoprotein fractions, and normal electrocardiogram tracings, and was considered to be a normal atherosclerotic. The roentgenogram revealed marked calcification and aortic arch measured 4.5 cm.*

FIG. XIV. *Thoracic and abdominal aorta. Moderate arteriosclerosis with slight atheromatous changes of the thoracic aorta and severe atheromatous changes of the abdominal aorta. Again, like the preceding changes, there were no significant biochemical changes. Moderate x-ray calcification and aortic arch dilatation.*

TABLE 1

SUMMARY OF DIAGNOSTIC FINDINGS

Methods	*Findings*	*Value*
Blood chemistries (400 patients)		
Cholesterol	Slightly elevated in females	?
Cholesterol esters	No significant change	0
Phospholipids	No significant change	0
Total lipids	Marked decline	?
Creatinine	No significant change	0
Nonprotein nitrogen	No significant change	0
Complete blood count	Slight decrease	0
Phospholipid-cholesterol ratio	Statistically inconclusive	0
Lipoproteins (75 patients)		
Ultracentrifuge Sf 0-12 / Sf 12-400	Lipoprotein classes reversed.	?
Atherogenic index	Atherogenic index reversed.	?
Electrophoresis Moving boundary / Paper electrophoresis (oil red 0 lipidograms)	No direct correlation with ultracentrifuge methods	?
Chylomicron count	Statistically inconclusive	?
X-ray studies (650 patients)		
Thoracic aorta / Abdominal aorta	Dilatation of the aorta may be more significant than the presence or amount of calcification	++
Electrocardiograms (500 patients)		
Usual electrocardiography	71 per cent within normal limits	+
Ballistocardiography	Technical difficulties still great	?
Eye studies		
Fundoscopic examination / Arcus senilis	Possibility of newer classification with relationship of amount of sclerosis to distance from optic disk	+
Pathologic studies		
Gross autopsies	In a state of great flux. Entire status in process of being re-evaluated	?

3. Is help available from the moving boundary or paper electrophoresis pattern?

Answer: Electrophoretic mobility depends on electrochemical properties, or surface charge density; the ultracentrifuge is mainly sensitive to density and molecular weight of large molecules. At this time, there is no justification for electrophoresis or ultracentrifuge determinations in the elderly atherosclerotic.

4. Can x-ray study be of any help?

Answer: The degree of dilatation of the aorta as well as the degree of calcification is of extreme importance. However, newer evaluation indicates that marked aortic arch calcification is increased in proportion to the degree of widening of the aorta arch. Lateral views of the abdominal aorta should be as routine as posterior-anterior views of the thoracic cage.

5. Are electrocardiograms typical of an aged individual?

Answer: There is no electrocardiogram typical of the aged person. Seventy-one per cent are within normal limits.

6. Are ballistocardiograms of help?

Answer: The technic is far from perfect and the technical errors are greatly multiplied in the aged individual. Until technics are much improved, the results appear to be more the result of the technician rather than the patient.

7. What about eye studies?

Answer: The classifications and findings have been status quo for many decades. Correlations with other clinical findings are high.

8. What about pathologic studies?

Answer: Increasing numbers of patients almost 100 years of age are reaching the autopsy table. A review of findings and present concepts is indicated, and is the subject of present research.

9. What about the "Threshold" age?

Answer: In all of the findings there appears to be an unexpected trend. Total lipids, certain serum lipoprotein classes, atherogenic index, degree of aortic calcification, and degree of aortic dilatation — all increase from youth until the "Threshold" age of 60 to 75, after which there is a decline or reversal of trends.

10. What occurs in this all important "Threshold" phase? Do certain degenerative, metabolic or enzymatic balances undergo changes in equilibrium?

Answer: The answers are still incomplete even with our newer methods of diagnosis; however, with further correlated pathologic studies, the answers may soon be found.

Diverticular disease of the colon

RUDOLF J. NOER, M.D.
LOUISVILLE, KENTUCKY

Diverticulitis is more dangerous than many realize. Acute inflammation, perforation, abscess or fistula formation, and hemorrhage may threaten life, and repeated attacks may bring obstruction and confusion in diagnosis between that disease and carcinoma. In acute diverticulitis, diversion of the fecal stream by a proximal colostomy will often prove life-saving. Between attacks, elective resection of localized areas of recurring diverticulitis is advised. Modern surgical technics make this possible with less risk to the patient than that of the attacks themselves.

◆ Diverticulosis and diverticulitis, associated as they are with people of advancing years, may be expected to claim more of our attention as the average age of the population continues to increase. Although statistical information on these conditions is difficult to evaluate, most reports indicate the incidence as between 5 and 20 per cent of all persons over 40. Hardly less difficult to evaluate is the likelihood of diverticulitis among those who have diverticulosis. Welch in 1953 estimated that approximately one-fifth of all people with diverticulosis would eventually become prey to diverticulitis and that approximately one out of five would require operative treatment.[1]

Diverticula, most commonly seen in the colon, may develop in almost any part of the gastrointestinal tract. Most fall into one of two categories: (1) "true" diverticula, whose walls include all layers of the gastrointestinal tract, and (2) "false" diverticula, whose walls consist of only the mucosal and serosal layers of the gut. Diverticula of the esophagus, duodenum, and small intestine are commonly of the "true" type, while those of the colon are almost invariably "false." The pathogenesis of colonic diverticula is obscure. The fact that they develop in the later years and are commonly seen in sedentary individuals has led many to feel that lack of muscular activity and loss of colonic muscular tone are major etiologic factors. Some believe that constipation and an elevation in intracolonic pressure associated with straining at stool are all-important in the pathogenesis. While this seems logical, diverticulosis does occur at times in strong, muscular persons who lead active, outdoor lives.

It is commonly thought that when these out-pouchings of the colon occur, they develop through an area of potential weakness at a point where vessels pass through the wall toward the interior of the colon. It is true that most colonic diverticula do tend to arrange themselves along the colonic wall in an area where vascular crossing is common. Further evidence is the rich vascularity of these diverticula, even in the absence of inflammation, and the intimate association of these vessels with the necks of the diverticula. On the other hand, diverticula are found in areas other than those where most vessels cross the colonic wall, and many have been observed without vascular association with their necks.

RUDOLF J. NOER *is professor and head of the Department of Surgery, University of Louisville School of Medicine.*

Though many ideas have been suggested,[2-8] the true pathogenesis of diverticula is not yet established.

Diagnosis

Diverticulosis is ordinarily of consequence only as complications arise. The mere presence of these out-pouchings of the colon is of little significance, and, as a rule, actual diagnosis is established only in the course of roentgen studies made while searching for other disease of the colon. With the exception of hemorrhage,[9] which will be discussed later, none of the complications indicating the presence of diverticula occur unless there is an inflammatory process.

Diverticulitis, on the other hand, is nearly always manifested by clinical findings sufficiently distressing to require treatment. The wide-mouthed, true diverticula of the small intestine are rarely the site of inflammation, for the fluidity of the small intestinal contents, together with the wide diverticular orifice, combine to produce easy emptying. The colon, on the other hand, has a much less fluid content, and the false diverticula, with their usually narrower mouths, are frequently the site of a severe inflammatory process. The nature of the diverticula tends toward development of obstruction. Stasis of fecal content within the sac, irritation, and edema combine to narrow the orifice further, even to the point of complete obstruction. Once the inflammatory process is acute, it commonly spreads to the surrounding bowel wall, and, if severe enough, or repeated at frequent intervals, considerable scarring and fibrosis of the wall ensues — sometimes referred to as peridiverticulitis. It is this process which is commonly responsible for the narrowing of the colonic wall in the later stages of recurrent diverticulitis. Consequent upon these pathologic processes are the all too common perforation and peritonitis, fistula formation, abscess formation, hemorrhage, and any of the variations which may occur among these various complications. Figure I presents these in tabular form.[10] The treatment of acute diverticulitis must always be aimed at prevention of these serious complications.

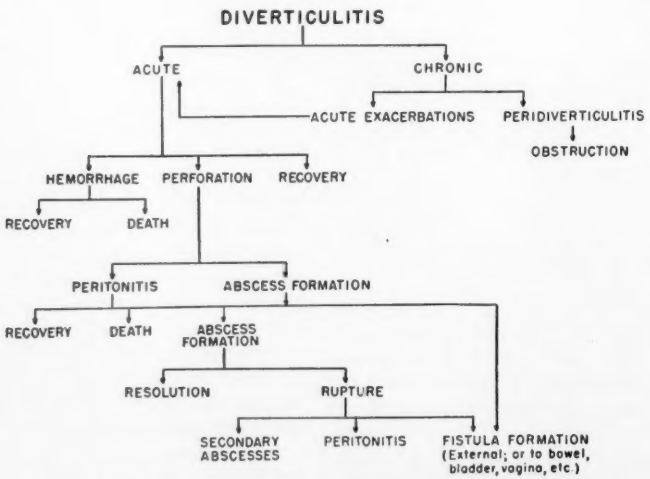

FIG. 1. *Complications of diverticulitis. Reproduced from Noer.*[10]

Treatment

Adequate dietary therapy and regulation of an individual's habits will do much to minimize the frequency or severity of attacks. Unfortunately, most persons do not know of the presence of colonic diverticula until they have had an attack of diverticulitis. Once this has occurred, however, the patient should be placed upon a low fiber diet, a regime of adequate fluid intake by mouth, and attempts should be made to establish regular bowel habits. Under such a program, many persons will continue for years without being seriously incapacitated.

In the presence of an acute inflammatory process, more active treatment is demanded. A brief period of bed rest, no food by mouth, parenteral administration of fluids, and antibiotic therapy are always indicated. If there is no subsidence in the inflammatory process, nor definite improvement in the patient's condition within twenty-four to forty-eight hours, there should be no delay in carrying out a proximal diverting colostomy, a measure which is sometimes truly life-saving. Since diverticulitis is most common in the sigmoid colon, most of these cases are well handled by a right transverse colostomy, but one must adhere to the principle of carrying out the diversion of the fecal stream at some point proximal to the inflamed area of the colon. True colonic rest cannot be achieved so long as fecal content passes across the inflamed area; on the other hand, it is sometimes astonishing to see how rapidly the signs and symptoms of acute colonic diverticulitis will subside after this procedure is performed.

The question of whether and when to close the colostomy after the acute inflammatory process subsides is not an easy one to decide. A great many patients do achieve quiescence of the disease by a dietary regime following one or even several attacks of acute diverticulitis. However, an inflammatory process severe enough to require a colostomy may be expected to have produced significant organic changes in the colonic wall. A period of six weeks to two months should be allowed before other therapy is instituted to permit the area to become quiescent. A barium enema roentgenogram at this point will be most helpful. The increasingly good results from elective resection of relatively localized areas of colonic diverticulitis would indicate the performance of this procedure before colostomy closure in a patient whose disease justifies this approach. The hazards of recurrent diverticulitis are real and far greater than many have admitted. Even in the absence of major hazards, the restrictive diet and the need to be on guard against recurrent attacks of inflammation combine to make life less full than might be desired. If the hazards and complications can be avoided and the patient's life made more normal by elective resection of a modest portion of the colon, much will have been achieved. With a proximal colostomy and proper preparation, the risk is low and the morbidity slight.

Complications

The complications of diverticulitis must be individualized and treated as circumstances require. A proximal colostomy is desirable in nearly all cases and, ideally, should be done from one to two months before undertaking any definitive operative therapy. This is particularly true in the case of fistulas extending from the colon to other organs or to the surface. Diversion of the fecal stream permits excision of the fistulous tract and closure of the bowel and the area to which the fistula extends, with reasonable expectation of a cure. Closure of the colostomy should be delayed until about two months after excision and closure of the fistula. Abscesses require drainage, and, if the process is still acute, the proximal colostomy must not be omitted. Operative closure of acutely perforated diverticula has been attempted with vary-

ing results. The tissue is usually quite friable and difficult to sew. It may be impossible to carry out a closure, in which case exteriorization is the only possible choice. Here again, the proximal diverting colostomy must never be omitted.

Hemorrhage has only recently been recognized as one of the major complications of diverticulitis and diverticulosis. Moderate bleeding has been reported in a large number of the reported series; most authors report an incidence between 10 and 30 per cent. Severe exsanguinating hemorrhage from diverticula is much less common, but has certainly occurred.[9] In an acutely bleeding patient, operative treatment should be avoided, unless demanded by uncontrollable hemorrhage. Here, as in all bleeding, the ideal approach is ligation of the bleeding vessels. Usually the only way this can be accomplished in the gastrointestinal tract is by some type of resection because of the rich anastomosis between the many vessels supplying all areas of the tract. The mortality and morbidity associated with resection of acutely bleeding areas of the colon in poor-risk patients inadequately prepared for surgery are considerable. It is always desirable to control hemorrhage by conservative management. If one is forced to operate, resection is the procedure of choice, although on occasion a critically ill patient may be deemed unable to stand the relatively atraumatic procedure of segmental resection, in which case a proximal diverting colostomy may achieve rest for the bleeding area and subsidence of hemorrhage. Adequate blood replacement is as important here as in all severe bleeding.

Obstruction, next to acute inflammation, is the most common complication of diverticulitis. The thickening and narrowing of the colonic wall produced by repeated attacks of diverticulitis usually narrows the lumen so that surgical relief is necessary. Difficulty sometimes arises in differentiating the roentgenologic appearance from the narrowing produced by carcinoma. The inflammatory thickening and fibrosis of peridiverticulitis may even produce a clinical picture hard to differentiate from an infiltrating type of carcinoma at the operating table. Whether the obstruction is due to carcinoma or to diverticulitis and peridiverticulitis, the only satisfactory solution is resection of the involved portions of colon and restoration of bowel continuity. If there is any doubt as to diagnosis, the type of resection which is considered suitable for carcinoma, with wide removal of lymphatic drainage areas, is certainly indicated. Should the disease prove histologically to be diverticulitis, no harm will have been done, and should it be carcinoma, the most adequate type of curative therapy would have been accomplished. In this, as in most operations for diverticular disease of the colon, a proximal diverting colostomy should be performed.

From the Department of Surgery, University of Louisville School of Medicine and the Louisville General Hospital, Kentucky.

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Anesthetic management of the aged for fractured hip surgery

RICHARD A. KOONS, M.D.
LOS ANGELES, CALIFORNIA

The anesthetic management of 300 geriatric patients undergoing hip nailing is discussed and a preliminary survey is made of postoperative mortality and morbidity. The causes of postoperative complications are related to patients' preoperative pathology, anesthesia, and surgery.

◆ The management of the elderly patient undergoing surgery presents problems not found in the younger adult. The changes during the process of aging involve all the physiologic systems of the body and influence not only the reactions to surgical trauma but also to anesthetic agents and technics of all types. An investigation was made of a group of these individuals having similar surgery in an effort to learn what might be done to improve their anesthetic management and care.

A study was made of geriatric patients having hip nailings for fractured femurs, and an evaluation was made of the anesthetic procedures used. The preoperative complications, operative and anesthetic course, and postoperative recovery of 300 patients were analyzed. The ages of patients ranged from 70 to 100 years. The anesthesia used was necessarily confined to a nonexplosive technic because of the spark hazard with x-ray equipment. The methods selected were spinal anesthesia, regional nerve blocks, and nitrous oxide-oxygen supplemented by intravenous barbiturates and Demerol. A preliminary study was also included employing the agent trichlorethylene in combination with nitrous oxide and oxygen.

RICHARD A. KOONS *is instructor in surgery (anesthesia) at the University of Southern California and College of Medical Evangelists and assistant director of anesthesia at Los Angeles County General Hospital.*

Methods

The preanesthetic medication and type of anesthesia were individualized according to the patients' preoperative status. The majority of the patients received 0.2 to 0.3 mg. of atropine or scopolamine approximately thirty to sixty minutes before induction; a few received 25 to 50 mg. of Demerol for pain relief approximately one hour prior to induction. Some received no preanesthetic medication. Spinal anesthesia was avoided if there were any neurologic contraindications or shock, and also if severe arthritis made the procedure traumatic or impossible. Senility, psychosis, and such mental disturbances often made regional or spinal anesthesia impractical. Inhalation anesthesia was usually avoided in the presence of such respiratory complications as pneumonia, asthma (including history of asthma), severe emphysema, bronchiectasis, and severe bronchitis.

No deaths occurred during surgery although there was one cardiac arrest in a 76-year-old male; he was successfully resuscitated and had an uneventful postoperative course. There was an 11 per

cent mortality during the first postoperative week, and a total of 16 per cent at the end of one month. One-third of these deaths came from the debility and senility seen so often in this age group and leading to such complications as feeding problems and malnutrition, as well as hypostatic pneumonia, decubiti, and thrombosis from lack of mobility. The prophylaxis and management of these problems is one of nursing care. The anesthesiologist looks for new and better methods to decrease any morbidity from the anesthetic procedure itself.

Complications

Postoperative depression is related to the problem of anesthesia. The greatest single factor in preventing postoperative complications in patients with fractured hips is early mobilization. The patient, therefore, must return to the ward as alert as possible. Preoperative medication must be maintained at a minimum. If regional or spinal anesthesia alone is to be used, the belladonna drugs are not necessary and may cause marked discomfort from their drying effects. With inhalation anesthesia, only small doses were administered since the secretions in the aged are much less than in younger patients. Atropine was preferred because scopolamine may produce excitement, especially in the presence of pain. If pain were present, Demerol was used for analgesia, and then only in small doses to avoid depression of both circulation and respiration. Morphine was not used, for its depressive effect is out of proportion to its analgesic effect in these patients. Supplementation of nitrous oxide-oxygen anesthesia with intravenous Demerol or barbiturates must be minimal.

Fortunately, only very light planes of anesthesia are necessary for this surgical procedure since the muscular tone is usually not great in the aged. All that is required is analgesia and enough immobility to perform the surgery. Overzealous use of Demerol—a moderately acting drug—near the end of a procedure instead of ultra-shortacting thiobarbiturates may prolong the period of postoperative depression. This is true not only in supplementing nitrous oxide-oxygen anesthesia, but also in the use of these drugs for sedation when regional or spinal anesthesia is employed. Relatively large doses of analgesics or sedatives must be avoided postoperatively and given only when necessary. It is remarkable how little pain these patients have postoperatively.

In reviewing the anesthetic records, it was found that the patients' vital signs varied greatly with the trauma of surgery and slight changes in the depth of anesthesia. This was due to the physiologic and anatomic changes that occur with senescence, reducing the body's capacity to compensate for such stress. The ability of these elderly patients to maintain a normal blood pressure with spinal anesthesia levels of T_{10} and below was much less than in younger persons. In fact, 45 per cent of the patients given intrathecal anesthesia had at least one blood pressure fall below 90 mm. Hg systolic. Only 22 per cent of those patients receiving inhalation anesthesia supplemented by intravenous drugs showed a drop below this level. Eleven of the patients who received spinal anesthesia had cerebral vascular accidents or mental confusion postoperatively. There were only three such complications in the group anesthetized by inhalation technics. Three patients who had spinal anesthesia developed myocardial infarcts either during or immediately following surgery. These complications occurred in the spinal cases despite immediate therapy when the hypotension occurred: oxygen was administered and blood pressure was returned as quickly as possible to normal levels by correcting the cause of the depression—with blood, if lost, or with vasopressors, if due to the spinal anesthesia. In some cases, these drugs

were effective in elevating the pressure drops due to surgical trauma.

In the inhalation group, the incidence of pneumonia appeared to be slightly greater than in the spinal group, with 7 cases in the first, and 3 in the latter group. There were also 3 cases of congestive failure; however, each of these had signs of cardiac decompensation before surgery.

Periods of hypotension seen during inhalation anesthesia supplemented with intravenous agents were found to be due chiefly to blood loss, excessive dosage of barbiturate or Demerol, or to surgical trauma, such as stripping periosteum and pounding on bone, even though light planes of anesthesia were maintained. However, if nitrous oxide-oxygen alone was sufficient in providing the patient with a state of analgesia and unconsciousness – although in some cases moving slightly–the vital signs were much more stable. Instead of trauma producing hypotension, there was often a blood pressure rise, an increase in pulse rate, and an increase in respiratory rate and tidal volume. Unfortunately, the number of patients who could be managed successfully with this technic was small. As a result of this experience, a supplement for nitrous oxide-oxygen was sought which did not have a depressing action on the circulation.

Use of Trichlorethylene

Since trichlorethylene had proved to be a potent analgesic and amnesic agent when used for pain relief in closed reductions of fractures, dental extractions, and for other short surgical procedures, it was decided to try it as a supplement for nitrous oxide and oxygen in the geriatric hip patients. If successful, it would provide a completely inhalation technic avoiding the hazards of irretrievable intravenous drugs. Since trichlorethylene cannot be used with soda lime absorption of carbon dioxide because of the toxic products formed, a non-rebreathing system was utilized. Induction was begun with nitrous oxide-oxygen in a three to one proportion, and if the patient were not sufficiently anesthetized by this agent alone within five to ten minutes, trichlorethylene was added to the mixture. This combination produced anesthesia in every patient to whom it was administered. However, the corneal and swallowing reflexes were retained in most instances, and some patients moved slightly upon stimulation. Surgical preparation of the patient could be started in ten to fifteen minutes, and induction was complete in fifteen to twenty minutes. At no time did the surgical team find the minimal movement that occurred in some of the patients a hindrance to procedures. In a few more robust patients, it was necessary to administer a small dose of 10 mg. of succinylcholine to produce muscle relaxation for the manipulation and reduction of the fracture. In contrast to the usual fall in blood pressure observed with surgical trauma, many of the patients developed a rise in blood pressure, tachycardia, and tachypnea–typical of stimulation in light anesthesia. Soon after the anesthesia was discontinued at the end of operation, the patients were as fully conscious and alert as they were preoperatively.

One disadvantage was that the younger and more active patients showed noticeable tachypnea to stimulation, which increased the minute volume to such a degree that very large flows of gases were necessary to maintain a non-rebreathing system. However, this type of patient can be easily managed with other technics; the debilitated, feeble individuals who showed untoward responses with other methods could be given trichlorethylene and nitrous oxide with ease and safety. The patients who showed marked tachypnea responded to very small doses of intravenous Demerol or barbiturate.

The series of patients who have been studied using this method of anesthesia is still small, but it indicates that trichlor-

ethylene and nitrous oxide-oxygen anesthesia may prove useful in the management of the debilitated geriatric patient for hip-nailing procedures. It may also be useful in other similar types of surgery and warrants a more extensive study.

Analgesia was provided in a few cases with regional nerve blocks. However, the number of cases in which this technic was used was too small for evaluation of this method.

Conclusions

A series of 300 geriatric patients undergoing hip nailing was studied and the following conclusions were drawn:

1. The most frequent causes for postoperative mortality and morbidity were senility, debility, and senile psychosis. The most effective prophylaxis was early mobilization.

2. Episodes of hypotension were most common with spinal anesthesia; and with this there was an increase in the occurrence of cerebrovascular accidents, mental confusion, and myocardial infarcts.

3. The incidence of pneumonia and respiratory complications was only slightly greater in the inhalation group.

4. A minimal use of analgesics and sedatives should be made before, during, and after surgery.

5. Low spinal anesthesia or general anesthesia with nitrous oxide-oxygen supplemented with barbiturates, Demerol, or trichlorethylene were found to be satisfactory technics for anesthetic management.

From the Department of Surgery, Los Angeles County General Hospital.

CAREFULLY planned elective cholecystectomy is borne amazingly well by old people, but an emergency procedure carries more risk with age. Any gallbladder with stones should be removed, even if asymptomatic. For an acute biliary attack with degenerative disease, cholecystostomy is done and, some months later, excision of the sac.

The age factor in biliary operations was noted in 4,050 cases, including those of 328 patients of 65 years or over. Complication and death rates of elective surgery were practically the same between 50 and 64 years as from 65 years on. In later life, biliary ailments tended to involve more instances of acute cholecystitis, more frequent, larger, and more numerous ductal stones, active disease with few symptoms or signs, and higher rates of cancer.

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Factors controlling longevity

HENRY S. SIMMS, Ph.D., and
BENJAMIN N. BERG, M.D.
NEW YORK CITY

◆ Long life may be looked upon as the result of failure to die – the failure to succumb to any of the prevailing causes of death. In our laboratory we are studying longevity in the rat in relation to the accumulation of lesions. In comparing the rat with man we find that the life span of a species is determined by at least six factors, exclusive of extrinsic influences, of sex, and of genetic variation within the species.

The life span of a species is determined by a number of factors involving the principal causes of death of that species, as well as the rate of onset and development of the lesions that contribute to death. The predominant factors limiting the life span are those that cause the progressive increase in death rate with advancing age.

Factors Involving Diseases and Death Rates

Three of these factors are concerned primarily with diseases and death rates. They will be discussed under their respective headings.

1. THE NATURE OF PREDOMINANT DISEASES AFFLICTING THE SPECIES

Autopsies on rats of all ages show that in our colony of inbred (Sprague-Dawley) rats, kept under unusually favorable conditions, the following diseases and lesions predominated in contributing to the death, or moribund state, of the animal:

Renal disease: chronic nephrosis and chronic glomerulonephritis, often with hypertension.

Tumors:

Epithelial: adenoma of the pituitary, fibroadenoma of the breast in the female, adenoma and carcinoma of the thyroid, islet tumor of the pancreas.

Nerve tissue: pheochromocytoma of the adrenal.

Connective tissue: subcutaneous fibroma, subcutaneous and peritoneal myxoma, fibrosarcoma of the liver.

Periarteritis, involving chiefly the pancreatic, mesenteric and spermatic vessels, as well as vessels in other organs.

Pulmonary disease, which in some colonies is the main cause of death:
chronic bronchiectasis,
bronchiectatic abscesses,
chronic pneumonitis,
acute diffuse necrotizing pneumonitis.

Degenerative disease of the striated muscle.

Myocardial degeneration and fibrosis, and left auricular thrombi.

Most of these diseases and lesions have their counterparts in man, but do not constitute predominant causes of death in man. Conversely, man's most lethal diseases, such as atherosclerosis and epithelial tumors of the stomach, lung, colon, prostate, breast and cervix, are rarely found in the rat.

2. INTRINSIC SUSCEPTIBILITY OF YOUNG ANIMALS

The second life-span factor is the intrinsic susceptibility of young animals to

HENRY S. SIMMS *and* BENJAMIN N. BERG *are on the staff of the Department of Pathology, College of Physicians and Surgeons, Columbia University, New York City.*

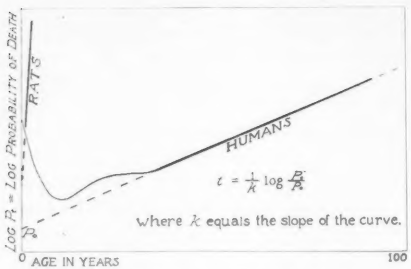

FIG. 1. *Rat mortality, as compared with human mortality, as a function of age. The logarithm of the mortality rate (per number of individuals alive in each age group) is plotted against age. The straight portion of each curve conforms with the equation.*

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diseases that are fatal to adults of the species. When the logarithm of the death rate from adult diseases is plotted against age a curve is obtained that is approximately a straight line, as in figure I. The intrinsic susceptibility P_0 of young animals to adult diseases (obtained by extrapolating the curve, for statistical purposes, to the time of birth) is 20 times greater in rats than in man. In other words, at the start of life rats have less resistance to the adult diseases than is the case with humans.

If we were to consider only the above two factors we might conclude that the reason rats die sooner than humans is because they are subject to more lethal diseases. Although this may be true in a sense it only partly accounts for the difference in life span.

3. INCREASED MORTALITY WITH AGE

The third life-span factor is the increase, with advancing age, in the mortality from the predominant adult diseases.[1] This increase is represented by the rising slope (k) of the curves in figure I. In rats the death rate increases with age *30 times faster* than in man.[2] This is the main reason for the shorter life span of the rat.

Our life expectancy is limited principally by the progressive increase, with advancing age, in the death rate. It will be noted that in the following equation for life expectancy (t), the value of k appears twice and the value of P_0 appears once.

$$t = \frac{1}{k} \log \left(\frac{1.6k}{P_0} + 1 \right)$$

Factors Involving Pathologic Conditions

The above three factors, concerned with the diseases and death rates, are in turn the result of at least three other factors involving the accumulation of pathologic lesions or conditions.

4. FREQUENCY OF CHANCE ONSET OF PRIMARY CONTRIBUTING LESIONS

This represents the probability that a primary lesion, of a type contributing to death, will by chance start to form in a given animal. The predominant lesions in the rat that we have mentioned have a high probability of chance accumulation—much higher than that of any primary chronic lesion in man.

5. THE TIME OF DEVELOPMENT OF LESIONS

This period, from the early to the late stage, is similarly very rapid in the rat as compared with man.

6. AGE FACTOR ACCELERATING ONSET

Our preliminary data indicate that there is an "age factor" that accelerates the frequency of onset of lesions in older animals.[3] Plots of the number of primary lesions per rat against the age of the rat were not straight line curves passing through the origin, as would be the case if the onset of primary lesions were governed merely by chance and were not influenced by age. Instead the curves become steeper with advancing age. In other words, recognizable primary lesions appear more frequently in the

older animals than can be accounted for by the chance frequency observed in younger animals. The nature of the age factor or factors is unknown.

We do not look upon age itself as being a direct cause of death. Age appears to increase the probability of onset of new primary pathologic lesions and hasten the manifestation of their lethal effects.

The question is often asked: What would happen if all known diseases were abolished? Our answer is this: We might expect to die from diseases that have not yet appeared in forms that can be recognized as clinical entities.

A word should be said about research on age and longevity.[4] When any agent or treatment is found to lengthen the life span it is not sufficient to report that the animals "live longer" than the controls. The relation to aging depends upon which causes of death are affected, and in what way. Many things that extend our life span, such as smallpox vaccination, have no relation to aging.

From the Department of Pathology, College of Physicians and Surgeons, Columbia University, New York City. Presented at the Third International Congress on Gerontology, in London, July 20, 1954.

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THE MAIN CAUSE of cervicobrachial arthritis in the elderly is bony outgrowth from the Luschka, or neurocentral, joints, rather than lateral protrusion of intervertebral disks. Osteophytes projecting into intervertebral foramina angulate, irritate, and compress spinal nerves. Among 60 adult cervical spinal segments analyzed post mortem, lesions were most frequent after the age of 50 and more pronounced in later life. Changes are usually seen in lateral oblique radiograms of the cervical spine.

Outstanding symptoms are pain in the neck and arm, paresthesia of the hand, and, less often, reduced sensitivity to pinprick, weakness, or muscle wasting. If not too many vertebrae are involved, apophysectomy may be done. Other methods are only palliative. Analgesics, short-wave diathermy, and immobilization of the neck in a plastic or plaster collar may be helpful. Stretching and manipulation should be avoided.

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The plasma protein pattern and its significance in geriatrics and cancer diagnosis

I. A. PARFENTJEV, D.Sc., and
M.-L. JOHNSON, Ph.D.
NEW HAVEN, CONNECTICUT

From the fractionation of 3,000 plasma samples, it was found that there is a normal plasma protein pattern which is maintained throughout adult life from 20 to 90 years. An abnormal pattern is characteristic of disease and is rarely found in well individuals below 80. However, in apparently healthy old people past the eighth decade, there is an increase of abnormal patterns. The significance of these findings is considered in relation to cancer diagnosis and geriatrics.

◆ The study of the plasma proteins throughout the normal life span and of the aberrations which are associated with disease has never been routinely applied in the diagnostic clinic. Hence the significance of the complete protein pattern for diagnosis and evaluation of therapy in conditions characterized by altered plasma proteins has not been exploited.

Methods of Study

In the present gerontologic studies, the effects of aging on the serum protein pattern were evaluated from the analyses of plasma samples taken from elderly individuals with no apparent disease. Representative plasma were obtained in homes for the aged and among elderly ambulatory patients of Grace - New Haven Community Hospital.

For the complete fractionation of plasma proteins in large numbers of samples, simple, accurate, but inexpensive method of analysis is essential. Use of the Rapid Micro Method for the turbidimetric determination of serum proteins[1] and its extension to fibrinogen[2] overcame the difficulties associated with current procedures for protein fractionation. By salting out with ammonium sulfate in highly dilute solutions and applying the principles of photometry, small aliquots of 0.02 to 0.50 cc. of unknown plasma samples were evaluated turbidimetrically and compared with standards of known protein content. The ease and accuracy of the method permitted the analysis of 3,000 samples of human, avian, and canine sera for detection of alterations associated with aging and with disease.

In the evaluation of individual protein patterns, several protein fractions were determined: (1) total protein; (2) total globulin; (3) albumin, determined as the difference between total protein and total globulin; (4) euglobulin which is largely gamma globulin; and (5) pseudoglobulin, which is the difference between total globulin and euglobulin, containing largely alpha globulin but also some beta and muco globulin.

It was found that absolute average values and limits could not be established for each fraction since there was a nor-

I. A. PARFENTJEV *is a research associate in the Department of Microbiology, Yale University School of Medicine.* MARIE-LOUISE JOHNSON *is a third-year medical student at Yale University.*

TABLE 1

CRITERIA AND CREDITS FOR THE EVALUATION OF NORMAL SERA

Key 1

Group	Total protein		Total globulin		A/G ratio		Pseudoglobulin		Acid precipitable (pH 5.1) fraction	
	Range	Credit	Range	Credit	Range	Credit	Range	Credit	Range	Credit
A	<6.00	3	<2.80	3	>1.10	2	<0.60	4	<0.39	4
					>1.20					
B	6.0-6.4	5	<2.80	5	>1.10	1	<0.60	1	<0.39	2
					>1.20					
C	6.4-6.8	5	<3.00	2	>1.30	1	<0.60	1	<0.39	2
			<2.40	3	>1.50					
D	6.8-7.2	5	<3.00	2	>1.30	1	<0.60	1	<0.39	2
			<2.50	3	>1.50	2				
E	7.2-7.6	5	<3.00	2	>1.30	1	<0.60	1	<0.42	1
			<2.60	4	>1.50	1	<0.50	1		
F	>7.6	3	<3.25	2	>1.40	1	<0.80	1	<0.58	1
			<2.70	5	>1.60	1	<0.70	1	<0.48	1

mal variation in concentration according to the total amount of protein in the plasma. For example, in proteinemic samples all fractions tend to be low; thus, a protein fraction might fall within the normal range but be abnormally elevated when compared to other fractions of the same proteinemic specimen. To guard against such misleading values, average normal patterns and limits were established at each of six different levels of total protein. All normal samples which fell within a certain total protein group were distributed so that the frequency with which concentrations of specific fractions were above or below an arbitrary value might be determined. The frequency established the relative significance of maintaining a specific subfraction above or below a given value. Thus, at a certain concentration of total protein, one fraction will weight the pattern more than another. If numerical values are ascribed to subfractional values which fall within prescribed limits according to this frequency distribution, then each subfraction of an unknown sample may be rated according to the mode at that level of total protein. The subfraction of the unknown will receive certain credit values if they are with the mode and fall above or below the arbitrary demarcation value. Any sample which is found to have two-thirds of the total number of credits possible is rated as normal. A key was established to facilitate the evaluation of any unknown sample (table 1).

In a similar way, plasma from cancer

TABLE 2

CRITERIA AND CREDITS FOR THE EVALUATION OF ABNORMAL SERA

Key 2

Group	Total protein		Total globulin		A/G ratio		Pseudoglobulin		Acid precipitable (pH 5.1) fraction	
	Range	Credit	Range	Credit	Range	Credit	Range	Credit	Range	Credit
A	<6.00	3	>2.90	3	<0.97	2	>0.60	4	>0.39	4
B	6.00-6.40	5	>2.90	5	<1.28	1	>0.60	2	>0.44	3
C	6.40-6.80	5	>3.00	5	<1.31	1	>0.60	2	>0.44	3
D	6.80-7.20	5	>3.00	3	<1.35	1	>0.60	2	>0.42	5
E	7.20-7.60	3	>2.90	2	<1.37	1	>0.60	5	>0.42	5
F	>7.60	2	>3.25	1	<1.39	3	>0.60	5	>0.46	5

TABLE 4

PLASMA PROTEIN PATTERN AMONG AMBULATORY PATIENTS AND RESIDENTS OF HOMES FOR AGED WHO HAD NO RECORD OF MALIGNANCY

Age group	Total number of cases*	Normal protein pattern	No apparent disease having abnormal protein pattern	Non-malignant disease having abnormal protein pattern	Number of cases with mixed protein pattern: Total cases	No apparent disease	Non-malignant disease	Average protein pattern for each age group.† Percentage in gm. per 100 cc.: Total protein	Total globulin	Albumin	A/G	Euglobulin	Positive globulin	Acid precipitate fraction	Fibrinogen
20 to 30	13	12	0	1	0	0	0	6.61	2.25	4.35	1.94	1.60	0.63	0.330	0.241
30 to 40	32	28	0	4	2	0	2	6.94	2.30	4.64	2.04	1.70	0.59	0.335	0.231
40 to 50	43	38	0	5	7	0	7	7.05	2.34	4.71	2.07	1.76	0.57	0.333	0.268
50 to 60	24	19	1	4	5	1	4	7.21	2.34	4.87	2.16	1.76	0.58	0.386	0.233
60 to 70	31	25	0	6	3	1	2	7.02	2.34	4.68	2.03	1.72	0.63	0.368	0.299
70 to 80	30	27	0	3	5	1	4	7.11	2.44	4.67	1.96	1.81	0.62	0.382	...
80 to 90	51	44	3	4	7	6	1	6.53	2.34	4.18	1.84	1.78	0.62	0.376	0.261

*Excluding cases with mixed protein pattern.

†Based on analysis of cases qualified by Key 1 as normal.

TABLE 5

PLASMA PROTEIN PATTERN ACCORDING TO AGE GROUP AMONG AMBULATORY PATIENTS WITH RECORD OF MALIGNANCY

Age group	Number of cases*	Abnormal protein pattern with active malignancy	Normal protein pattern with active malignancy	Normal protein pattern in old treated cases	Mixed protein pattern active malignancy	Mixed protein pattern in old treated cases	Average protein pattern for each age group.† Percentage in gm. per 100 cc.: Total protein	Total globulin	Albumin	A/G	Euglobulin	Pseudo-globulin	Acid precipitate fraction	Fibrinogen
20 to 30	1	1	0	0	0	0	5.83	2.00	3.83	1.91	1.32	0.68	0.415	0.280
30 to 40	3	3	0	0	0	0	6.72	2.90	3.83	1.31	2.02	0.88	0.594	0.378
40 to 50	5	4	1	0	0	1	6.58	2.79	3.79	1.36	1.80	0.98	0.496	0.353
50 to 60	13	12	1	2	0	4	6.40	2.86	3.54	1.26	1.93	1.04	0.553	0.451
60 to 70	19	14	5	3	2	3	6.84	3.16	3.68	1.17	2.34	0.82	0.548	0.440
70 to 80	15	13	2	9	0	2	6.58	3.07	3.51	1.18	2.28	0.79	0.509	0.462
80 to 90	6	6	0	3	1	0	6.58	3.08	3.49	1.13	2.08	1.00	0.596	0.415

*Including columns 3 and 4.

†Based on analysis of cases qualified by Key 2 as abnormal.

patients from 20 to 90, at all stages of malignancy and treatment, was grouped so that the protein subfractions might be evaluated according to frequency distribution. The abnormal protein pattern which is associated with malignancy is characterized: (1) by an increase in total globulin; (2) a decrease in albumin with a tendency to reverse the A/G ratio; (3) an increase in pseudoglobulin; and (4) an increase in certain acid-precipitable proteins, insoluble at *p*H 5.1. A key was established for the identification of protein patterns with these characteristics (table 2).

Results

A certain group of plasma was found to be of a mixed pattern showing certain characteristics with the pattern of neoplastic disease while retaining some important features of normal plasma. There was a tendency among these samples to maintain a normal level of total globulin and albumin and hence have a normal A/G ratio, while at the same time there was no tendency toward proteinemia. However, the pseudoglobulin was significantly increased as were the acid-insoluble proteins.

The average values for three types of protein pattern are presented in table 3. This table combines all samples of a group irrespective of the total protein content and is of no value in identifying an unknown sample. However, the differences among the average values in the various groups are apparent. In the actual evaluation of an unknown sample, the plasma protein pattern was matched on key tables 1 and 2 against those values given for a plasma sample of the same level of total protein.

The diagnostic significance of abnormal protein pattern shown in the table is stressed by the fact that it was found in malignant cases before there was any derangement of health, but seldom occurred in ambulatory patients with various nonmalignant conditions. By contrast, patients with advanced chronic disease had a protein pattern characterized by a much more profound deviation from normality due to such factors as cachexia, chronicity, and therapy.

To study the effect of aging on the complete plasma protein pattern of more than 343 individuals ranging from 20 to 90 years, all samples were divided into two major categories, those from patients with and those from patients without a record of malignancy. Within these groups the analyses were distributed according to age, but not sex, since there was no statistic evidence for such a subdivision. The first groups of samples were obtained from (1) normal donors; (2) from residents in homes for aged who had no record of illness; and (3) from ambulatory patients without apparent disease. Results of our study of these cases are summarized in tables 4, 5, and 6. For every age group we selected those samples which satisfied our criteria of normality according to the key tables. The average protein pattern of such normal plasma is shown in the right side of table 6. In all seven age groups the per cent of plasma with normal protein pattern varied from 79 to 92 per cent, with an average frequency of 86 per cent. Of the 14 per cent with abnormal protein

TABLE 3

NORMAL PLASMA PROTEIN PATTERN CONTRASTED WITH ABNORMAL AND MIXED-GROUP PATTERNS

Protein pattern	*Total protein*	*Total globulin*	*Albumin*	*A/G*	*Euglobulin*	*Pseudoglobulin*	*Acid insoluble fraction*	*Fibrinogen*
Normal	6.91	2.46	4.45	1.80	1.86	0.60	0.361	0.26
Abnormal	6.70	3.10	3.60	1.15	2.12	0.78	0.54	0.48
Mixed	7.00	2.56	4.35	1.74	1.74	0.80	0.50	

TABLE 6

FREQUENCY OF DISTRIBUTION OF ABNORMAL PROTEIN PATTERN

Age group	*Number of cases*	*Number of cases with normal protein pattern*	*Number of cases with no apparent disease having abnormal protein pattern*	*Number of cases with no apparent disease having mixed protein pattern*
20-30	12	12	0	0
30-40	28	28	0	0
40-50	38	38	0	0
50-60	21	19	1	1
60-70	26	25	0	1
70-80	28	27	0	1
80-90	53	44	3	6

pattern in this group, only 2 per cent was in the cases with no apparent disease, and 12 per cent in patients with various nonmalignant conditions.

In estimating the frequency distribution, those sera with a mixed protein pattern were not included. Table 4 includes all cases with no record of disease and includes samples with a normal, abnormal, and mixed protein pattern. We found that 93 per cent of cases in this composite group had a normal protein pattern, 2 per cent were abnormal, and 4 per cent were mixed. Thus, the screening technic used in these studies enabled us to recognize a high percentage of healthy individuals.

At present, the small group with a mixed protein pattern must be considered separately. This group consists chiefly of chronic treated cases and further study is required to evaluate and determine the significance of the mixed protein pattern.

The findings indicate a consistency of the normal protein pattern in healthy individuals throughout life. Instances of an abnormal protein pattern were predominantly in cases of disease. Only in the late age group of 80 to 90 years was there a higher percentage of apparently healthy individuals – actually 17 per cent – who did not have a normal protein pattern.

Tables 4 and 6 indicate that there is a consistent normal serum protein pattern throughout life, while table 5, in a similar way, shows that the characteristics of cancer sera are little affected by age. In the study of malignancy, we found that many cases of long-treated patients, including some terminal cases, showed a return of the abnormal protein pattern to normal. These cases, which totaled 30, were not included in calculating the frequency distribution of values in the abnormal protein pattern compatible with malignancy. The average protein pattern of each age group of cancer patients was calculated from cases screened by both key tables and considered typical of active malignancy.

Discussion

The correlation of a certain plasma protein pattern with a given clinical syndrome is limited to a very few conditions, and little has been done to define the aberrations in the subfractions of the plasma proteins which are associated with disease. The literature contains much conflicting data not only concerning abnormal patterns but the nomal as well.

In the estimation of the normal protein pattern, for example, values vary from author to author. Certain data concerning the normal concentrations of protein in the plasma are very much out of line even though they are based on electrophoretic analyses. In several publications, a total globulin level of 3 gm. per 100 cc. or more is regarded as the "normal control,"[3,4] whereas more recent

studies have established the average concentration of globulin in normal plasma at approximately 2.5 gm. per 100 cc.[5-9]

Once the normal plasma protein pattern has been established, the diagnostic utilization of such a pattern depends upon the facility of the test and the normal variations associated with sex and aging. In the routine analysis of plasma subfractions, we have used our Rapid Micro Method of turbidimetric analysis which is simple and inexpensive. It provides data which are in close accord with those of Cohn and his coworkers,[10] who used salting-out technics with ammonium sulfate, and are directly comparable to the electrophoretic analyses of Mider and his associates.[7]

According to our study, the effect of aging on serum protein is not apparent in human beings, but it is very noticeable in some animals. In dogs[11] and chickens,[12,13] the aging of serum protein begins very early in life and consists mainly in the increase of globulin at a permanent level of albumin. Hence, throughout life there is a tendency to reverse the albumin-globulin ratio. The increase of total globulin in these species could be attributed to unsanitary conditions and excessive exposure to the microbial agents of disease,[14] similar to the hyperimmunization with bacterial antigens which leads to an increase of globulin. Ravet-Hérion[15] has reported on the development of albuminemia during the life span of a mouse, an observation which should be considered in connection with the work of Parfentjev[16-18] and Wicks[19] on the copious excretion of protein in the urine of normal mice.

At birth, human beings and animals have a low protein content in their blood. Polson[20] found only 3.7 per cent protein in the serum of the foal, which was gradually augmented, reaching an adult level of 6.8 per cent at the eighth month. Similarly, Swanson and Smith[21] found an increase in the rate of plasma nitrogen in rats from 0.81 gm. per 100 cc. of plasma at the weaning period of twenty-one to twenty-eight days to 1.22 gm. when the rats were 360 days old. Brandt and associates[22] found in electrophoresis that serum in chicks 4 to 7 days old contains 3.36 ± 0.25 gm. per 100 cc. of protein as compared with a value of 5.40 ± 0.71 gm. per 100 cc. for laying hens.

Rapoport and coworkers[9] and Trevorrow and Hill[5] found in infants a low serum protein content ranging from 5.4 to 5.7 per cent which reaches an adult level at the fourth or fifth year. However, during maturation the concentration of albumin rises faster than globulin. In our studies we have found a consistent plasma protein pattern between the ages of 20 to 90 years, with deviation from the normal pattern occurring primarily in cases of disease. These findings are in close correlation with those of other authors. Although Bock,[8] using the salting-out procedure, found a moderate albuminemia and a slight increase of globulin in old age, Olbrich,[23] using the same technic, found that advancing years brought a slight decrease in the total protein content of human plasma. Significantly, his data for the concentration of albumin and globulin did not reveal an abnormal protein pattern. Parhon and Werner,[24] studying serum of the aged, observed an increase in the lipid content but found no alteration in the proteins. Contrary to the observations of these authors, Rafsky and associates[25,26] reported an abnormal electrophoretic protein pattern in all 52 sera from people 65 to 95 years of age and without disease. In any case, an abnormal protein pattern among very old people who are seemingly well deserves thorough investigation and indicates the necessity for routine analyses of blood protein.

Apart from the diagnostic value, the current investigations stressed the importance of determining plasma protein pattern in the evaluation of the efficiency of therapy. In the fractionation of the plasma of 169 patients who had a history of

malignancy, but who showed no recurrence from two to twenty-five years, a normal protein pattern was found in 92 per cent of cases.[27-30]

In the reports to the Third International Cancer Congress, we discussed in detail the literature concerning the changing protein pattern in individual patients following various treatments such as surgery, x-ray irradiation, and blood transfusions. Even in the choice of therapy, the determination of plasma protein pattern is said to be important, and Gombert[31] pointed out that fractionation of serum protein can be correlated with the effective dose of roentgen ray according to the level of albumin.

The possibilities which have been discussed outline the scope of the application of serum protein pattern for diagnosis and geriatrics, and underscore Shock's lament that "available information with respect to age changes in various blood constituents has been singularly lacking."[32] Application of the turbidimetric method of protein analysis would seem to fill a long-sought need.

From the Department of Microbiology, Yale University School of Medicine, New Haven. This investigation was supported by a research grant from the National Cancer Institute of the National Institutes of Health, U.S.P.H.S.

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Falls among elderly people living at home

HUGO DROLLER, M.D.
LEEDS, ENGLAND

◆ Four-fifths of all fatal home accidents in England occur in small children and in old people.[1] Three-fifths of such fatalities occur in old women. The death rate from falls rises rapidly after 65, until there are about three times as many deaths from falls in women as in men.[2] In 1949, 0.6 per cent of all the deaths of men over 65 were due to falls and 1.3 per cent of all deaths in women.

Information about the frequency of falls in an elderly population living in their homes was not available until Sheldon's investigation in Wolverhampton in 1948.[3] He noted the high incidence of falls among the elderly—40 per cent—and devoted a most interesting chapter of his book to a discussion of the mechanism of falls. However, the subjects of the Wolverhampton survey were not examined medically and Sheldon had to rely on carefully taken histories.

The following observations on incidence and effects of falls are based on a medical survey[4] of elderly people of Sheffield, living alone or with their consorts in their own homes.

The Survey—Subjects and Methods

In 1948 a social survey was carried out by the Sheffield Council of Social Service on a sample of all people of pensionable age in Sheffield.[5] The sample was selected by a procedure described by Greenlees and Adams and included one out of every 30 persons in the group. The medical survey was based on the original sample and included all those living alone or living with consort who could be traced and who were willing to have a medical examination. Of 672 possible subjects, 476 were fully examined.

The question of falls was discussed twice with each subject, first by the social worker on her preparatory visit, and again by the examining physician. Information was sought on falls, their frequency, their seriousness, and whether they required medical attendance and rest in bed. Were the falls due to environmental factors or to disability or both? Did the subject sustain a fracture, and at what age and at what site?

Causes of Falls

It was found that falls increase with age and that women fall at an earlier age than men (table 1). Of the sample of 476 subjects, 170, or 35 per cent, had sustained falls. Falls are caused by many external factors and pathologic conditions. They are frequently multiple and difficult to unravel.

Giddiness and dizziness are traditionally blamed for falls. It is, however, difficult to get from an inarticulate person an accurate description of what he means by giddiness or dizziness, which may be used to convey any unpleasant sensation above the diaphragm. One-half of the sample complained of a sensation of apparent movement, which we mean when we talk about vertigo; but only one-third of those complaining of vertigo had experienced falls.

HUGO DROLLER *is consultant geriatric physician of the Leeds Regional Hospital Board and the geriatric unit of St. James' Hospital, Leeds.*

TABLE 1

AGE COMPOSITION AND LIABILITY TO FALLS

	Men			Women			Whole sample (*Excluding women below 65*)		
Age	*Number at risk*	*Number liable to falls*	*Per cent of age group*	*Number at risk*	*Number liable to falls*	*Per cent of age group*	*Number at risk*	*Number liable to falls*	*Per cent of age group*
60				44	12	27			
65	39	7	17.9	105	47	40.8	144	54	37.4
70	79	14	17.7	75	42	56	154	56	36.3
75	74	24	32.3	60	36	60	134	60	44.6
Totals	192	45	23.4	284	137	48.2	476	170	35.7

Other common pathologic conditions are arthritis, cerebrovascular lesions, and weakness. There was a small group of persons who suffered from sudden loss of muscle tone and difficulty in righting themselves. One person complained that his legs gave way for no ascertainable reason.

Defective vision might be expected to account for many falls, but this was not so. Only 4 women had falls caused by bad vision; 3 had cataract and the fourth was almost completely blind from glaucoma.

Deafness is closely associated with labyrinthine failure and we saw 3 men and 15 women who were severely deaf who had had attacks of vertigo and had fallen frequently.

The "liability to fall" is always bound up with the "opportunity to fall." This leads us straight to the environmental factors (table 2).

ENVIRONMENT

The social survey of 1948 revealed that only a small proportion of the elderly in Sheffield live in dwellings specially designed for them. Sixty per cent of the sample lived in houses with outside sanitation; toilets were frequently at a distance from the house and had to be reached across unlit and unpaved pas-

TABLE 2

CONDITIONS CONTRIBUTING TO FALLS

Conditions contributing to falls	*Men*	*Women*
Clinical conditions:		
Vertigo	28	56
Skeletal deformity and disease and arthritis of lower limbs	9	26
Old cerebrovascular lesions	3	7
Postural hypotension	5	10
Weakness	3	8
Sudden loss of muscle tone		4
Difficulty in righting		2
Legs giving way without ascertainable cause		1
Defective vision		4
Environmental conditions:		
Tripping	5	23
Living on steep hills		4
Unsuitable stairs		8
Loose rugs or defective floors		22

TABLE 3
PATTERN OF FALLS—PLACE

Situation	Men (192)		Women (284)		Total (476)	
	Number	Per cent	Number	Per cent	Number	Per cent
Street	7	3.6	16	5.6	23	4.8
Domestic	3	1.6	41	14.4	44	9.2
Total	10	5.2	57	20.0	67	14.0

sages. Seventy-two per cent lived in houses built before 1920 – houses with narrow staircases, steps too high, lack of bannisters, poor illumination, old-fashioned kitchen ranges, and fireplaces with protruding corners. To this should be added defective household implements, old and decrepit furniture, unsuitable floor coverings, and gaps in the floor boards.

Conditions in Sheffield are made worse by the steep hills and the harsh winters. The seasonal incidence of falls was not investigated, but the case histories contain many references to icy roads and other hazards caused by weather.

SEX DISTRIBUTION

There was an excess of women who fell. This is accounted for by there being more old women than men. The margin which cannot be so accounted for can be explained by the greater domestic activity of women and the prevalence of arthritic changes in the weight-bearing joints.

Living habits differ in elderly men and women, and this may have a bearing on the accident rate. Men reduce furniture to a minimum to do away with unnecessary dusting and cleaning, but women do not wish to be parted from their possessions and surround themselves with an extraordinary assortment of furnishings.

ACCIDENTS

Of the sample group, 170 had sustained falls since retirement. Only major falls can be presumed to have been recorded. Falls were divided into two groups – those which happened in the street and those occurring at home (table 3). In either case, certain patterns emerged.

Falls in the street were almost equally divided between the sexes; they were most frequent before age 70. After 70, the old person does not seem to venture so often across the streets.

An "accident" can be considered as any hazardous situation in which an individual fails to respond correctly. It is difficult to define it properly when pathologic conditions of a subject coincide with an environmental hazard. I have made no attempt to separate the two, but have listed in table 4 the situations in which the falls occurred.

Falls on slippery or icy roads are most common, followed by falls while crossing the street due to collisions with vehicles. Sometimes buses and trams do not stop long enough to allow an elderly person to get on or off, so that he is thrown off or dragged along. Two per-

TABLE 4
PATTERN OF FALLS—SITUATION

Situation	Number
Street	
Injured by vehicle whilst crossing street	6
Falling getting off bus or tram	5
Falls on slippery road	8
Falls on slippery road and subsequent injury by passing motor vehicle	2
Domestic	
Falling down the stairs	17
Falling from chairs, stepladders, window ledges	10
Slipping on loose carpets	8
Tripping	4
Unknown	5

TABLE 5
FRACTURES

Age	Men			Women			Combined		
	Number at risk	Fractures	Per cent	Number at risk	Fractures	Per cent	Number at risk	Fractures	Per cent
60-69	39	10	25	149	30	20	188	40	21.2
70	153	4	2.6	135	6	4.4	288	10	3.4
All	192	14	7.3	284	36	12.6	476	50	10.5

TABLE 6
SITE OF FRACTURES

Site of Fracture	Men		Women	
	Number	Per cent	Number	Per cent
Arms, elbow, wrist	2	4	16	32
Ribs, scapula, clavicle	4	8	6	12
Leg, ankle	2	4	7	14
Femur	1	2	2	4
Hand	1	2	2	4
Patella			2	4
Foot	2	4	1	2
Pelvis			1	2
Skull	1	2		

sons fell on roads and were injured by cars after they had fallen down.

Falling down the stairs is the most common among domestic accidents. This is most often caused by lack of equilibrium either from vertigo or from some defect in the stair leading to tripping. Falling from chairs, stepladders, and window ledges is almost always the result of some domestic activity such as putting in new light bulbs and cleaning windows.

Fractures

Of the sample group, 50 persons had sustained fractures since age 60. Case histories showed that the force required to break a bone was often quite trivial.

In a domestic survey such as this, we assume that we shall meet the fittest survivors of such shock-producing conditions as fractures of the long bones. This explains the small numbers of persons seen who sustained fractures after 70 (tables 5 and 6). This is quite in keeping with hospital statistics which show the rapid rise in motality from falls and fractures after 75. The numbers we meet at home are the group who have survived.

The histories of the 10 subjects who sustained more than one fracture provide a fascinating commentary on the domestic circumstances, the frailty of bones, and the strength of mind of some of these elderly people. The following histories are typical:

Case 1. This 74-year-old man had widespread Paget's disease and severe vertigo. Since the age of 65, he had fractured the left femur, right scapula, left wrist and ankle on various occasions, always while in the home.

Case 2. This 70-year-old man fractured his elbow at 58 and his clavicle at 65, both in industrial accidents.

Case 3. This woman, aged 68, had fractured the left femur at 52 when she was "blown over by a gale;" at 59, she broke the other femur during a fall due to dizziness; and at 61, while rushing up the stairs, caught her foot in a carpet rod and broke the patella.

Case 4. This woman, aged 76, fractured her patella and had a comminuted fracture of the tibia at the age of 72. At the time of her accident, she was hanging up the laundry and as the chair on which she was standing was a bit wobbly she put an old brick under one leg of it!

General Health and Physical Findings

The physician assessed the subjects of the survey in three medical categories—fit, moderately fit, and unfit. Of those liable to falls, 41 per cent were unfit; of the whole sample, 27 per cent; and of those not liable to falls, only 18 per cent. It appears that the subjects who fell were as a group less fit than the rest (table 7).

It was also found that in men in all age groups those who fell were less fit than the others. In the women the differences

were similar except in the oldest group, in which those liable to falls were as fit as the rest. The sample was too small to assess the significance of this last finding.

There was no clear-cut correlation of vertigo with falls. Although the number of persons suffering from vertigo was large, only 35 per cent were liable to falls. The incidence of fractures in women who complained of continuous vertigo was the same as in women who had fractures but did not complain of vertigo.

We had previously shown that excessive height of systolic and diastolic blood pressure is not related to vertigo or falls.[6] On the other hand, a small group of persons of the survey showed a fall in blood pressure on assuming the upright position after fifteen to twenty minutes' rest.[7]

These people were much disabled by the hypotensive condition which made them lose balance immediately on rising from a chair or when stooping. One man and two women within this group suffered from aortic incompetence. They were the only persons with cardiac conditions associated with falls in this survey.

Examination of the central nervous system showed no constant correlation between falls and incidence of hemiplegia, parkinsonism, and absent vibration sense. On the other hand, an extensor plantar response was four times more frequent in those men who fell than in the rest; and in women it was almost twice as frequent. This tendency to a disturbance of the corticospinal pathway was also seen in a group of 468 consecutive patients who were ambulant and awaiting return to their homes from the long-stay annex. This group, which was used as a control, was more frail generally and somewhat older.

TABLE 7
GENERAL HEALTH BY PHYSICIAN'S ASSESSMENT

	Fit	*Moderately fit*	*Unfit*
Whole sample	111	222	124
Liable to falls	22	78	70
The rest	89	144	54

It is difficult to assess the role of minor cerebrovascular attacks in the causation of falls. Minor cerebral accidents are often associated with falls, vertigo and temporary incontinence,[8, 9] as shown in the following history:

Case 5. This man, aged 73, was a former bricklayer. At 67, he fell 15 feet from a scaffold, but did not lose consciousness and had no concussion. When he tried to get up, he found that he had a complete right hemiplegia. When examined, he still had residual signs.

Similar observations were made on the long-stay annex control group, in which 14 cases of minor cerebrovascular attacks with pyramidal signs and tendency to falls were discovered.

Discussion

The literature on falls of the elderly is not extensive. The Registrar General's returns gave information on the mortality from falls. Sheldon in his Wolverhampton survey drew attention to the great frequency of falls.[3] Seiler and Ramsay discussed falls in the context of home accidents requiring hospital treatment and stressed the importance of environmental factors.[10] Scott discussed falls of the elderly, stressing the general diminution of all forms of sensation and adverse home conditions.[11]

The findings of the Sheffield survey coincide closely with those of Wolverhampton regarding the tendency to falls. There were many more fractures in the Sheffield survey, but this may have been due to the hilly nature and the inclement winters of Sheffield.

There seems little doubt that involutionary changes in the central nervous system are ultimately responsible for the loss of balance and falls. The extensor response which was found with increased frequency among those liable to falls is evidence of involutionary change of the nervous system.

Whitfield showed that results of per-

ceptual and cognitive tests were average or above average in elderly miners of 53 to 66, but that they had poor motor control and coordination.[12] If we accept Whitfield's definition of an accident as "failure to make an adequate response to a hazardous situation" we can see the elderly person coming to grief, either because he cannot control his motor apparatus with sufficient speed to save himself, or because he is no longer capable of deciding whether there is a hazard and, if so, what action to take.

This raises interesting points of training. Whitfield's elderly miners were good or average in their perception but had poor motor control. However, they would behave more circumspectly than the younger persons, and thereby prevent accidents from happening.

Jokl, while studying a group of 1,704 elderly active gymnasts from 60 to 82 years in age, demonstrated statistically that the trained elderly person has better control of his motor apparatus and kinesthetic mechanism than the untrained, or even the untrained younger person. He concluded that constant muscular training throughout life has an excellent inhibitory effect on all manifestations of aging.

The findings of Whitfield and Jokl appear to be an important corollary to the clinical evidence of pyramidal tract damage in an elderly population subject to falls. Whether falls, like other manifestations of aging, can be prevented by gymnastic training, as Jokl indicates, we do not know. Whitfield's miners appear to have been physically fit but still accident prone and with poor motor coordination, whereas Jokl's gymnasts had superb motor coordination.

Prevention

Among the clinical impressions of the survey is the picture of the old men and women who had remained physically and mentally active and had not experienced any falls and that a much larger group of persons who had deteriorated physically and had experienced many falls.

Among the small number of still active sportsmen of the survey, was a man of 76 who had played at least one round of golf daily for the last thirty years. He had the strongest handgrip, was in perfect health, and was mentally superior to most of his contemporaries. He had never experienced a fall.

Much of the infirmity resulting from falls in the old may be avoided by prevention of accidents to the elderly, through control of their environment by education and perhaps by physical training continuing through life.

From the Department of Social and Industrial Medicine, University of Sheffield, and the Geriatric Unit, St. James' Hospital, Leeds, England.

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SOCIOMEDICAL PROGRESS

Planning leisure-time activities of the aging

LEO CHALFEN, Ph.D.
NEW YORK CITY, NEW YORK

This paper presents criteria for use in developing leisure-time programs for the aged. Conclusions are based on a study of the activities and desires of 208 old persons in old age homes and old age centers in New York City.

◆ In planning leisure-time activities for the elderly, we must remember that leisure time is nearly all the time for the older person. It does not mean time so much as it does a philosophy or practice of life. What the practice will be is dependent upon the roles assigned the person, on his desire to accept or reject these social pressures, and on his ability to act independently of the people around him.

A program which is beneficial to society as a whole is one which is inexpensive, requires the smallest number of specialized personnel, develops better citizenship, and gives broad coverage. It should consider physical fitness, mental health and efficiency, social and moral character, emotional and creative expression, and the esthetic appreciation of the persons it serves. One activity may be useful in several ways. For example, weaving rugs may give a paralyzed man the job he wants, at the same time that it satisfies his esthetic needs, activates malfunctioning muscles, stimulates planning capacities, and may even increase his self-esteem and social prestige.

LEO CHALFEN *is a consulting psychologist with the New York Institute for Gestalt Therapy, New York City.*

Individual physical and psychologic appraisal of requirements, together with individual and group provisions for gratification through recreation, adult education, occupational therapy, vocational placement, group work, medical care, and individual psychologic counseling, should be employed to meet the objectives specified. All planning should be sufficiently flexible to utilize principles as they are discovered and corroborated.

The criteria which follow were developed from the findings of a study in which random samples of 108 persons in 7 old age homes and 108 persons in 7 centers for the aged in New York City were interviewed individually. The subjects consisted of both men and women over 65, varied in race, religion, occupation, employment status, desire for employment, education, living arrangements, birthplace, rural or urban upbringing, economic and marital status.

Criteria for Leisure-time Activities

These criteria may serve as a basis for setting up a plan or for assessing a program already set up.

CAPACITIES

Appreciation of the physical status and capacities of the aged aids in preserving what is still good and in stimulating greater fitness and efficiency. The tasks presented should be in harmony with the individual's abilities, so that a vigorous man need not be denied carpentry work.

EDUCATION AND TRAINING

Consideration of the individual's training and education reveals past skills which may be reactivated and earlier interests which may be released. Ascertaining the present level of skill helps in grouping persons of equal proficiency, as in card games or musical pursuits. It may prove valuable economically and psychologically in encouraging persons skilled in some field to teach their associates, who are amateurs.

NEEDS

The individual's needs can be determined only by continued contact or professional diagnosis – preferably with both. The desires for response, new experience, recognition, expression, participation, security, and beauty are universal and should be considered with respect to their relative importance in the group rather than for actual existence. Individual drives for self-esteem, personal identity and independence, freedom of action, social approval, usefulness, and other gains should also be given opportunity for release, unless they are in conflict with the best interests of the group.

SPECIFIC REWARDS OR CONTENT

Good adjustment results, in part, from the contributions of a program to individual satisfaction of needs, fulfillment of wishes, and participation in activity. The content of the program must be meaningful to the individual, either initially or after explanation. Great care must be used in recommending activity to the person who feels guilty because nonemployment is considered idleness, or who regards recreation as child's play.

Ingenuity on the part of the professional workers and clarification of the subject's attitudes are necessary to determine the value of any activity to an individual. Thinking in such terms as active and passive, cultural and noncultural, director and spectator, and in the empiric terms of music, leather work, and reading is necessary in planning group programs, but the ultimate decision is best arrived at by estimating the number who would be rewarded in their own goals by the initiation of these pursuits. Self-sustaining workshops might be initiated.

PERSONAL PHILOSOPHY

The attitudes, values, and habits of a group are not difficult to ascertain, if the members are from the same subculture. For the individual, however, the task is more exacting, especially in the old person of foreign birth who speaks a different language. Since the atmosphere of the place is influenced by views which are nondemocratic or which stress what Veblen called "conspicuous consumption"–an invidious comparison of the use of time, money, and effort–as well as by interesting cultural differences in utilizing leisure, knowledge of these patterns can help make or break a program.

DEMOCRATIC ATMOSPHERE

Using democracy as a criterion means reeducating many persons before the program may be credited positively. The desire to be with people like themselves need not operate against a leisure program for the aged. When they congregate with their desired associates, the many groups may be brought into contact through visits to other centers, clubs, and homes and through cooperation in projects of mutual interest. The better understanding achieved may carry over to

other persons with whom the aged come in contact. Participation in formulation and operation of programs is stimulating and satisfying to many persons. Homes are especially remiss in encouraging self-determination and freedom of activity.

INDIGENOUS AND PROFESSIONAL LEADERSHIP

Leadership for an elderly group requires personal and professional maturity commanding respect even when the philosophy of leisure appears heretical to the senescents. A good leader can encourage indigenous leadership which is wholesome, democratic, and pleasing to many individuals. He can, ingeniously and indirectly, get persons into activities which may satisfy their talents and wishes. He may extend contacts and make the aged more aware of community resources.

PERSONALIZED PROGRAM

Since many of the aged are alone, their associations at the recreation center may be a substitute for the family. All personalizing activities help, such as anniversary parties, recognition of achievements, and invitations to engage in various endeavors. Since many feel rejected, the aid of acceptable leaders, professional and indigenous, is valuable.

EXISTING FACILITIES

Using existing physical facilities cuts down on expense for operation and administration. Many older people are interested in working, and could carry out some of the duties related to a program for the aged. Schools, settlement houses, and churches are places which might be used by senescents in the community.

CONVENIENCE

A program which operates every day and evening in the week, and whose location precludes hardships of weather, travel, and fear of dark streets would be desirable. Places such as settlement houses and community centers provide the contact with young age groups which the elders seek. These specifications make it possible for those residing in old age homes to meet other groups in the community when they get out.

INTEGRATION OF SERVICES

A high level of organization is important since it helps in reaching program objectives and prevents conflicting philosophies. In an institution such as a home or hospital, the policy on work, recreation, and rehabilitation should be unitary. In community planning, policy based on scientific investigations rather than on popular beliefs is desirable, and integration of services for the aged should facilitate the operation of the program. Older persons could more easily obtain desired aid if specific bureaus were responsible for such functions.

LONG-RANGE PLANNING

A policy and planning board should be an integral part of every program for the aged. Changes are occurring in size and character of this older segment of our population, and research is under way. Information derived from such sources should be used in planning any program.

PHYSICAL AND PSYCHOLOGIC EXAMINATION

This criterion is questionable, since old people are loath to be studied or tested. Those who cooperate will be rewarded with a program which can meet better their individual specifications. Knowledge of a person's physical condition, mental level, interests, skills, and values makes a satisfying program more readily attainable.

PHYSICAL AND PSYCHOLOGIC TREATMENT

This criterion also has limited applicability. The value of physical and mental health is occasionally overridden by the fear of knowing what is out of order and the anxiety to do something about the malfunctioning. Treatment which can be translated into concrete terms with desirable rewards may be more acceptable —such as aid in getting along with one's children or help in getting employment.

Gerontologic progress in Norway

VIKTOR GAUSTAD, M. D.
OSLO, NORWAY

Norway, like many other countries, found herself poorly equipped to meet the growing needs of a greater elderly population. Since the war, however, notable advances have been made in the founding of a national committee, a survey of nursing homes, establishment of health centers, and increased medical and rehabilitative care.

◆ In Norway, as in several other countries, the structure of population has changed considerably during the last decades, with a disproportionate increase in the older age groups. In 1920, the group of 65 and over comprised a little more than 7 per cent of the total population; in 1950, it formed more than 9 per cent; and, according to the latest estimate, in 1970 it will comprise more than 13 per cent. Norway is in many ways unprepared to meet this shift in population. Until after the war, social services for old people were aimed chiefly at building old-age and nursing homes.

Old People's Health Committee

The problems of the aged were not given full consideration until the postwar years. In 1947, Per Hanssen, M. D., gave a lecture before the Medical Society on "Geriatrics—A New Branch of Medicine," stressing the need to further both research and practical activity in geriatric medicine. At a meeting in 1948, Karl Evang, general director of public health, called upon the National Tuberculosis and Public Health Association to take up gerontology as their particular scientific interest. In 1950, the Association formed the Old People's Health Committee, which the following year received the additional sponsorship of the Norwegian Women's Public Health Association. The committee is now divided into three different subcommittees on gerontology, geriatrics and practical health and welfare. The Committee instigated a national survey on the living conditions and the health status of the aged, and the results are being studied by Axel Ström at the Institute of Social Medicine of the University of Oslo.

VIKTOR GAUSTAD *is medical director of the Geriatric Department of Ullevål Hospital in Oslo.*

Old Age Pensions

Persons who have reached 70 are entitled to old-age pensions. The rates have been raised considerably since the war, and are now 1,400 kroner, or $206, for single persons, and 2,160 kroner, or $309, for married couples. Some municipalities grant supplementary pensions, so that in Oslo, the rates are 2,664 kroner, or $380, for single persons, and 4,320 kroner, or $617, for married couples. Many municipalities also grant allowances for house-rent and fuel, and, in whole or in part, give free medical help, medicine, and hospital treatment.

Today about 75 per cent of the population over 70 are on old-age pension. The annual expense incurred by the pension, which in 1937-1938 amounted to 50 million kroner, was raised in 1954-1955 to 300 million. Removal of the means test, which limits the number of eligible persons, would increase the expense by 100 million kroner.

Health and Welfare Centers

The Old People's Health Committee helped to found several health and welfare centers for the aged in Oslo as well as in other towns. The organization of these centers is comprehensive and aims chiefly at considering the problems of the aged as a whole. Their organizational plan has also aroused interest abroad. The task of each center is to organize the various assistance activities which enable the aged to stay in their homes, and insure their proper living and health conditions. The population served by each center is presumably between 20,000 to 30,000, or between 2,000 and 3,000 aged. Larger towns are divided into districts of suitable size, each with its own center, as the program aims at decentralized activity.

Four centers are now established in Oslo, and provision is made for three more. The services offered, which differ somewhat in each center, include hot-meal service, home help, chiropody,

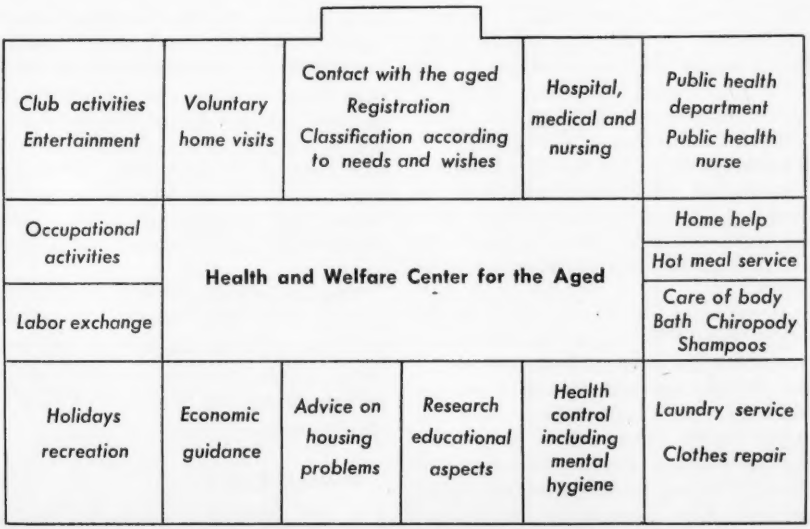

FIG. 1. *Functions and activities of Old Age Health and Welfare Center.*

health control, club activities, volunteer home visits and arrangement of day excursions into the country (figure 1). Old people are encouraged to apply at the centers when in need of assistance, but the staff of the center must also make home visits to those who do not apply, as many of these persons have isolated themselves socially.

It is important that a careful evaluation and record is kept of the needs of the old people. For instance, there might be a saving in home help if the person in question is given foot care. Since the need of help will vary from time to time, it is important that the record and services are coordinated.

A leaflet on "The Aging Population," prepared by the Old People's Health Committee, is a full report on problems of the elderly and on the organization of the health and welfare services for the elderly. It was designed for the information of the voluntary organizations and public institutions working within this field.

Gerontological Society

The Norwegian Gerontological Society was founded on April 29, 1954, and held its first annual meeting on November 19, 1954. The Society has about 50 members, consisting of scientists and others especially interested in gerontology. It is organized as a section of the National Tuberculosis and Public Health Association, and its purpose is to further gerontologic research and to insure that practical activity has a genuine scientific basis.

Nursing Homes

In 1953, questionnaires were sent to all the 551 old age and nursing homes in Norway. Local health officers and the public health nurses assisted in collecting the material. Replies were received from 547 homes, housing a total of 13,573 persons. This corresponds to 0.4 per cent of the population. A total of 5,794 persons were reported as being in need of nursing care. Only 59 homes were strictly old age homes, with no cases in need of nursing care. In 214 homes, up to one-third of the inmates required nursing care; in 162, between one-half and two-thirds needed such care; and in 58, more than two-thirds. Fifty-four homes had only patients needing nursing care.

Of the total number, 1,730 persons, or 12.7 per cent, were below 65. Most of these were 55 to 64 years in age, but there were also several younger persons, including some children. Most of those younger than 65 had been placed there because of feeble-mindedness and mental deficiency. There were also found, with declining frequency, patients with organic nerve disease; patients with diseases of joints and muscles, and other organic conditions; psychotics; blind and deaf; homeless persons; and orphans. The survey thus proves that the old-age homes are occupied partly by persons who do not belong there.

In addition, among those over 65 were found many demented, agitated, and difficult persons, who were unsuited for the homes. More than one-fourth of the inmates lived in rooms with three or more beds. Many homes were old and poorly furnished. A few lacked running water, and as many as 65 per cent had no running water in the bedrooms. Thirty-five homes were without bathrooms, and 55 homes had out-of-door toilets. Only about 40 per cent employed one or more nurses.

This survey proves that the conditions and the care of the aged in the institutions are far from satisfactory, and that many things must be amended before the institutions will be abreast of modern requirements.

Hospital Care

The first geriatric hospital in Norway was opened in November 1952, as a de-

FIG. II. *The Geriatric Department, Ullevål Hospital, Oslo, Norway.*

partment of Ullevål Hospital in Oslo, a well-organized hospital with about 2,000 beds (figure II). The geriatric department, with 182 beds and very modern equipment, has the following functions:

1. General medical examination of patients, and treatment and nursing care.

2. Rehabilitation of patients for ordinary daily routine to render them as self-dependent as possible.

3. Classification of patients, based on medical and social information, with regard to future accommodation—in their homes, old age homes, nursing homes, psychiatric institutions, etc.

Special attention is paid to the rehabilitation program and to the future accommodation of patients, and in a big hospital like Ullevål it has proved useful to have these functions centralized in one department.

In 1953, the average hospital stay per patient in the geriatric department was about ninety days, but in 1954 it was seventy-five days.

Continued Employment and Retirement

Only a few publications on gerontologic subjects in Norway have as yet been issued. We shall mention a survey of the possibility of keeping the elderly in active work for a longer time. This survey was made in 1951 at the initiative of the Ministry of Local Government Affairs and Labor. The results, worked out by the Central Bureau of Statistics, were published in *Arbeidsmarkedet*, 1954.

The survey included 107 establishments with a total of 4,980 elderly employees, consisting of 3,673 men and 1,307 women. These included all those who were to retire within ten years. Information was collected from employees, employers, and the establishment physicians.

Results of the examination of male employees who were to retire within two years showed that the employers thought that 79 per cent would be able to continue work after retirement age, 11 per cent might have part-time work, and 10 per cent should retire. Physicians thought that 84 per cent would be able to work full time, 3 per cent part-time, and 13 per cent should retire. Seventy-one per cent of the employees wanted to continue full-time work, 4 per cent wanted part-time work, and 25 per cent wanted to retire. Even if this survey were supposed to give some orientation only, it clearly indicates that it might be possible to make more use of the work capacity of the elderly.

Present Needs

As shown by this report, not much has as yet been achieved in the gerontologic field in Norway. We are now in an epoch which may be characterized by the need of surveys of different kinds, such as an analysis of the needs of the aging as well as the need for an effective organizational apparatus which might contribute to the solution of the comprehensive problems of the aged.

Book Reviews

Reactions with Drug Therapy

HAROLD L. ALEXANDER, M.D., 1955. Philadelphia: W. B. Saunders Company. 301 pages. $7.50.

Here is an important, well organized, effectively documented, and satisfactorily indexed reference work on the untoward reactions likely to be encountered in the use of the multitude of significant drugs now available in medical practice. It has many helpful warnings for the undesired reactions that may occur particularly in old people, and especially in relation to sensitivity of the skin.

There are 18 chapters, organized with respect to mechanisms, dermatologic manifestations, systemic patterns, and then with regard to specific types of drugs. One is impressed by the fact that practically all drugs currently available are capable of giving undesired reactions. Almost the only important drug that seems to be free from danger is ascorbic acid!

Specific references give the opportunity for detailed consideration of untoward effects from any particular drug. Valuable suggestions are made with regard to the management of undesired drug reactions. This book should serve usefully as a basic reference source in the field.

CHAUNCEY D. LEAKE, M.D.
Galveston, Texas

Hypertension and Nephritis

ARTHUR M. FISHBERG, M.D., 1954. Philadelphia: Lea and Febiger. 986 pages. $12.50.

This is the fifth edition of the standard work which has given satisfaction for years. It has been over fifteen years since the last revision, and during this time much has been learned of the effects of traumatic shock, especially during war, also much about electrolyte economy, and the bedside application of such knowledge.

Much more is known about Kimmelstiel-Wilson's disease of the glomeruli which occurs commonly in diabetes, and the frequency of pyelonephritis is better recognized today. There have been advances in knowledge about nephritis and about the treatment of essential hypertension with newer drugs. All these topics have been discussed in this well-written, well-documented book.

WALTER C. ALVAREZ, M.D.

Financing Hospital Care for Non-wage and Low-Income Groups

HARRY BECKER, Editor, 1955. Volume 3 of Financing Hospital Care in The United States. New York: McGraw-Hill Book Co. (Blackiston Division). 110 pages. $2.50.

This volume presents the report of the Commission on Financing of Hospital Care. This commission was created and sponsored by the American Hospital Association as a non-governmental agency in 1951 to function for two years. The 34-member commission has previously addressed itself to such questions as: (1) How much of the increased cost of hospitalization is due to expanded service; (2) How much is due to higher costs; and (3) By what means may costs be held at a minimum without impairing quality of service?

The small volume summarizes and tabulates much statistical information, and presents a series of recommendations formulated and adopted by the entire commission. These should be of great interest to hospital administrators, members of lay boards responsible for the financing of all private hospitals rendering service to the indigent sick, and to legislators and government personnel concerned with the operation of tax-supported institutions. How valid the recommendations are can be demonstrated only by continuous study and analysis of the consequences of their application.

EDWARD J. STIEGLITZ, M.D.
Washington, D. C.

Urology

Edited by MEREDITH CAMPBELL, M.D., 1954. Philadelphia: W. B. Saunders Co., Philadelphia, 1954. Three volumes, 1148 figures. $60.00.

This magnificent system of urology will be of interest to all geriatricians because old people and particularly aged men are so often troubled by urinary difficulties. Troubles due to a large or carcinomatous prostate, or to cystitis are common of course. There are also papillomas of the bladder, and stones in the kidney, ureters, and bladder. There also are the medical diseases of the kidney.

In volume 3 there are chapters on the several types of prostatectomy. It is unfortunate that there is almost nothing on the relative merits of the several types of operation, together with the indications for them, and the usual mortality rates.

The three big volumes are well written and beautifully illustrated. There is a good article on the diseases of the adrenal glands and some chapters on endocrinology.

WALTER C. ALVAREZ, M.D.

(Continued on page 49A)

When your geriatric patient turns his back on food . . .

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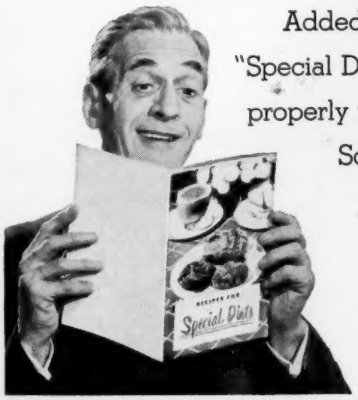

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CEREALS, STRAINED & JUNIOR FOODS

Activities and Announcements . . .

Michigan Conference on Aging

The University of Michigan will hold its eighth annual Conference on Aging in Ann Arbor on June 27 to 30, 1955. Topic of the conference is "*Aging–Applying Today's Knowledge Today*." Several government agencies and the Michigan State Medical Society have joined the University in sponsorship of the Conference.

Workshop enrollments will be limited in order to keep groups small, so that preregistration is urged. For further information write Wilma Donahue, Division of Gerontology, 1510 Rackham Building, Ann Arbor, Michigan.

•

American Heart Association

The American Heart Association will hold its annual meeting in New Orleans from October 22 through 26. For information write the Medical Director, American Heart Association, 44 East 23rd Street, New York City 10, N. Y., not later than July 1.

Housing for Aged

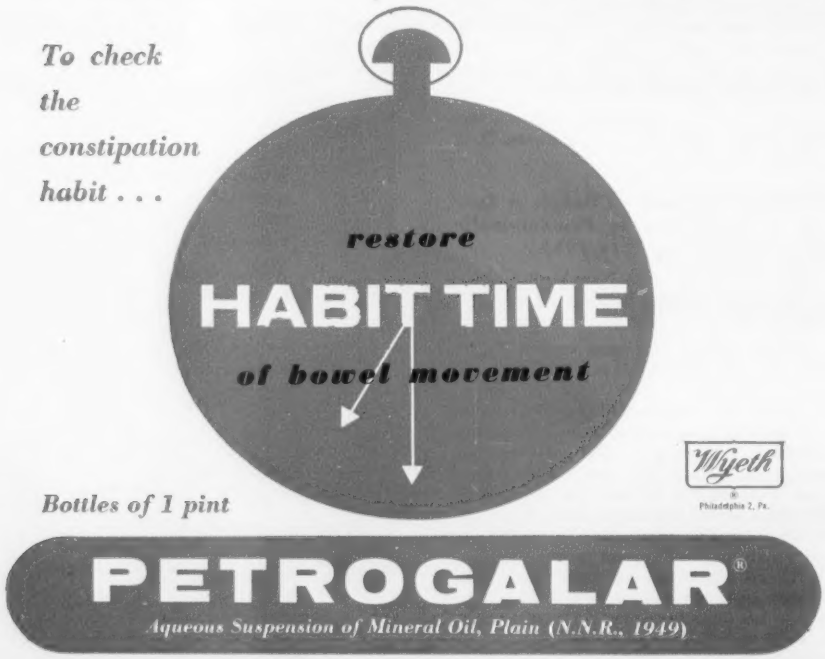
A $2,500,000 public housing project for older people is being planned by San Francisco which has a larger percentage of residents 65 years or older than any other city in the west. Doctors will cooperate with architects in providing quarters especially designed for the comfort and safety of older people. There will be elevators for the infirm, ramps allowing the use of wheelchairs, as well as such safety factors as small bathtubs, hand rails, nonskid floors, and all-electric kitchens.

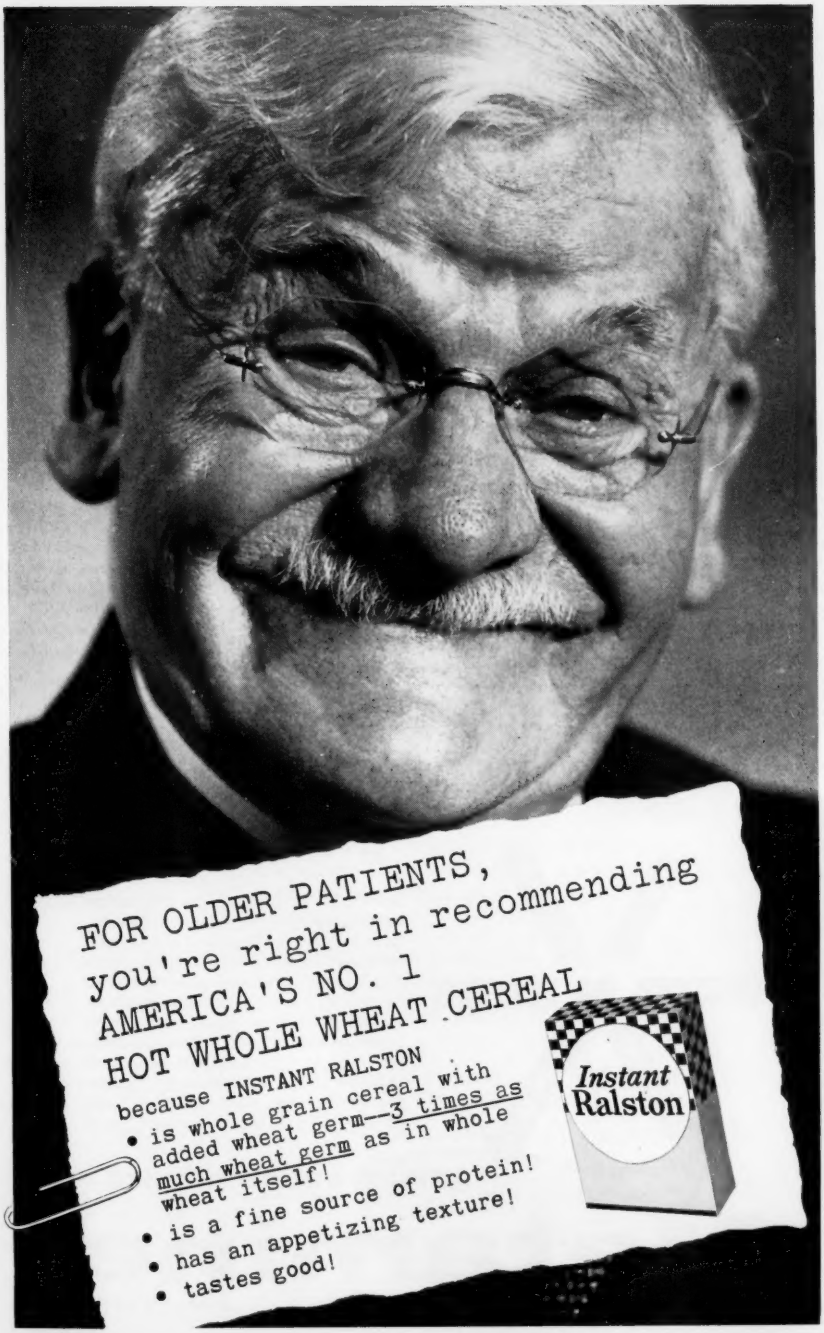
•

Current Reading

The winter issue of the Quarterly Bulletin of the Wisconsin State Board of Health is devoted to "Health Problems of the Aged" and features such articles as "Good Food Habits for Older People" and "Helping the Elderly Patient Combat Heart Disease."

(Continued on page 52A)

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Activities and Announcements . . .

(Continued from page 50A)

Booklet on Day Centers

Day Centers for Older People, by Henry L. McCarthy, Commissioner of Welfare, New York City is fourth in a series on "How Public Welfare Serves Aging People." This 15-page pamphlet tells exactly how to establish and operate a center. The author bases his information on more than a decade of experience in New York City. Single copies are 30 cents. For information, write to the American Public Welfare Association, 1313 E. 60th Street, Chicago 37.

EDITOR'S NOTE

The footnote to the article "An Intensive Treatment Program for State Hospital Geriatric Patients," page 111, March issue, should read:

STUART EMORY ATKINSON, *formerly a psychologist at Fergus Falls State Hospital, Fergus Falls, Minnesota, is now research assistant at Child Study Center, Philadelphia.* STANTON PAUL FJELD *is a psychologist at Fergus Falls State Hospital.* JOHN GEORGE FREEMAN, *formerly clinical director at Fergus Falls State Hospital, is now clinical director at Jamestown State Hospital, Jamestown, North Dakota.*

Angina pectoris prevention

Most efficient of the new long-acting nitrates, METAMINE prevents angina attacks or greatly reduces their number and severity. Tolerance and methemoglobinemia have not been observed with METAMINE, nor have the common nitrate side effects such as headache or gastric irritation. Dose: 1 or 2 tablets after each meal and at bedtime. Also: METAMINE (2 mg.) with BUTABARBITAL (¼ gr.), bottles of 50. THOS. LEEMING & CO., INC., 155 EAST 44TH STREET, NEW YORK 17, N.Y.

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- **Diabetics** are prone to develop fatty livers and atherosclerosis.

When ideal control cannot be secured, *Gericaps* may aid your management by preventing the disturbance of lipid metabolism.

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And in addition:

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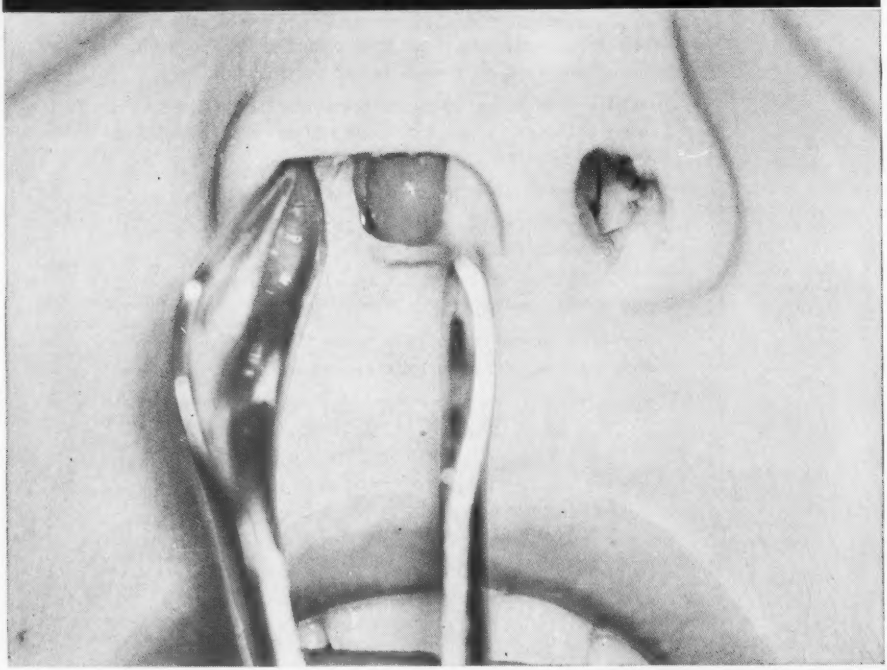
MAJOR ADVANTAGES: Greater anti-allergic action than cortisone; smaller doses produce equivalent therapeutic response.



HYDROCORTONE is one of the most effective agents available for combating the distressing symptoms accompanying hay fever and vasomotor rhinitis.[1] However, systemic hormonal therapy should be reserved for those cases which fail to respond to less potent medication, or which are accompanied by asthma. In suitable candidates, steroid therapy produces prompt relief in a high percentage of patients. Tapering off of dosage is desirable since this may prolong the duration of remission after therapy is discontinued.

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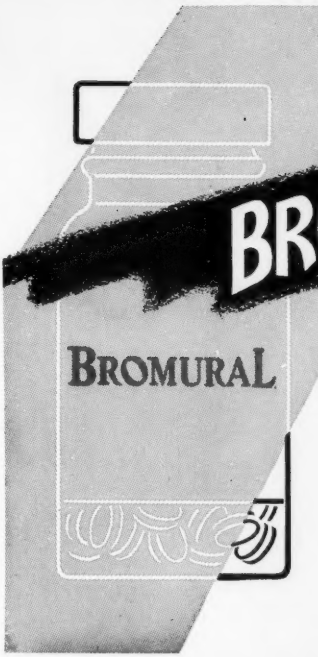
1. LUKENS, F. D. W., *The Medical Uses of Cortisone*, The Blakiston Company, Inc., New York, pp. 331, 341, 1954.



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prescribe Bromural for daytime sedation, one tablet every three to five hours. For sleep, 2 or 3 tablets upon retiring or when wakeful during the night.

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look like regular nylons . . .
yet give the support you recommend.

For further details and leaflets for your patients write Johnson & Johnson New Brunswick, N. J.

Meat...

Dietary Cholesterol and Vascular Sclerosis

Recent studies reaffirm the "hypothesis that atherosclerosis is fundamentally a metabolic disease subject to important dietary influences"[1] and do much to refute contentions that foods containing cholesterol should be avoided in general diets.

Arterial disease resembling that in human subjects was produced in Cebus monkeys fed diets high in cholesterol and low in sulfur amino acids. Within 2 to 8 weeks after initiation of the regimen serum concentration of cholesterol rose to levels of 300 to 800 mg. per 100 ml. "The hypercholesterolemia could be largely prevented by feeding 1 gram per day of dl-methionine or l-cystine as supplements to the diet." Also, the elevated cholesterol levels "could be restored to normal by feeding 1 gram of dl-methionine but only partially restored by 0.5 gram of l-cystine daily."

According to the investigators, the "vascular lesions were in the ascending aorta but extended from the valves of the left ventricle to the proximal portions of the carotid and femoral arteries . . . The aortic lesions were chiefly characterized by the presence of lipid-laden phagocytes and increase in collagen and elastic fibers. The lipids were in part cholesterol derivatives."

Cholesterol, an essential metabolite produced in intermediary metabolism,[2] is biosynthesized from dietary protein, fat, and carbohydrate.[3] Normally, its synthesis is exquisitely controlled to insure adequacy as well as to protect against an oversupply.[4] Furthermore, considerable evidence indicates that an increased cholesterol intake is not an etiologic factor in alleged aberrations of cholesterol metabolism such as atherosclerosis.

In widely variable amounts, cholesterol occurs in foods of animal origin—meat, poultry, fish and marine foods, eggs, milk products—all foods of great nutritive value.[3] Present knowledge in no way warrants alteration in the customary consumption of these foods because of their contained cholesterol.

Skeletal muscle of beef, lamb, pork, and veal provides but small amounts of cholesterol, approximately 0.06 Gm. per 100 Gm. moist weight of meat.[5] Since atherosclerosis may interfere sharply with normal nutrition, the patient should consume diets rich in protein foods (such as meat), vitamins, and fruit.[6] In addition to high quality protein, meat supplies valuable amounts of needed B vitamins and essential minerals.

1. Mann, G. V.; Andrus, S. B.; McNally, A., and Stare, F. J.: Experimental Atherosclerosis in Cebus Monkeys, J. Exper. Med. *98*:195, 1953.
2. Okey, R.: Use of Food Cholesterol in the Animal Body; Relation of Other Dietary Constituents, J. Am. Dietet. A. *30*:231 (Mar.) 1954.
3. McLester, J. S., and Darby, W. J.: Nutrition and Diet in Health and Disease, ed. 6, Philadelphia, W. B. Saunders Company, 1952, pp. 517-518.
4. Editorial: The Biosynthesis of Cholesterol, J.A.M.A. *152*:1435 (Aug. 8) 1953.
5. Okey, R.: Cholesterol Content of Food, J. Am. Dietet. A. *21*:341 (June) 1945.
6. Wright, I. S.: Arteriosclerosis, in Stieglitz, E. J.: Geriatric Medicine, Medical Care of Later Maturity, ed. 3, Philadelphia, J. B. Lippincott Company, 1954, chap. 28, p. 413.

The Seal of Acceptance denotes that the nutritional statements made in this advertisement are acceptable to the Council on Foods and Nutrition of the American Medical Association.

American Meat Institute

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Products and Services

Award Competition for Medical Students

The tenth annual Schering Award competition for medical students was announced recently. Titles of subjects on which American and Canadian students are invited to submit papers this year are: Current Concepts in the Management of Osteoporosis; Prevention and Treatment of Blood Transfusion Reactions; and Recent Trends in the Clinical Use of Adrenocortical Steroids.

A $500 first prize and a second prize of $250 will be awarded for each of the three subjects. Outstanding authorities in each field will select the winners. Special recognition in the form of a professional gift will be given each student submitting a meritorious paper. Deadline for entry forms specifying the choice of title is July 1. Manuscripts should be mailed not later than October 1. Students may compete individually or cooperatively in teams. Outstanding papers are brought to the attention of appropriate professional journals.

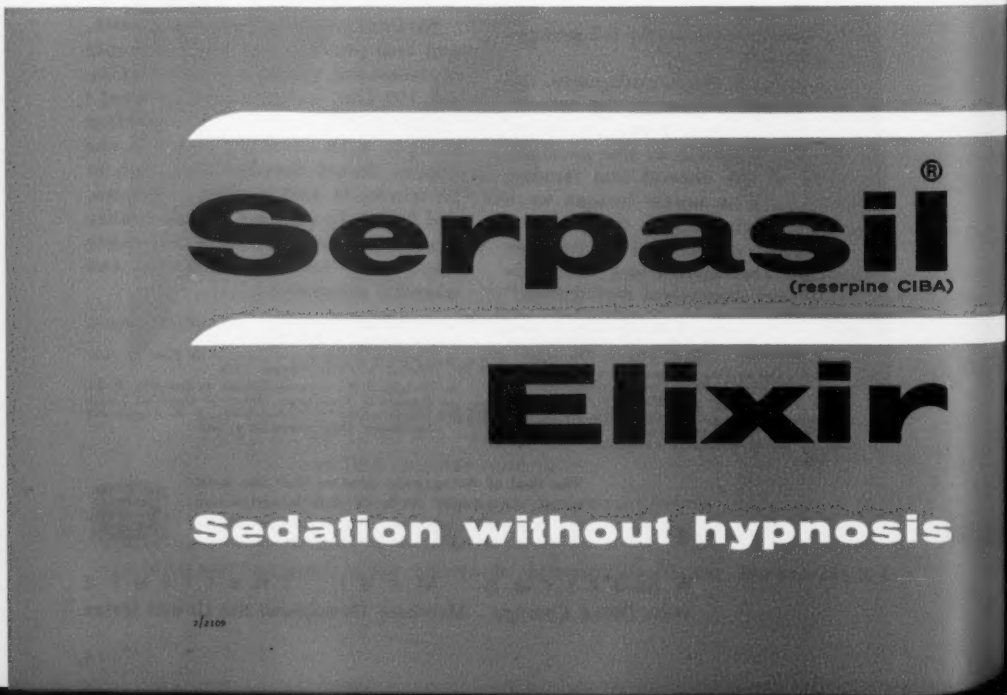
Information and instructions for the competition are available from the Schering Award Committee, 60 Orange Street, Bloomfield, N. J.

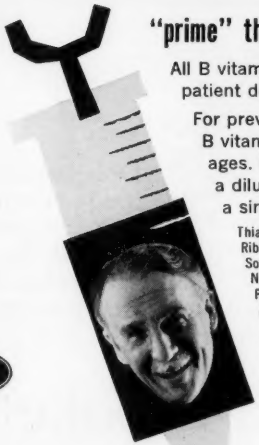
Chlorophyllin Found To Inhibit Hemagglutination

Chlorophyllin will inhibit agglutination of chick red blood cells by the viruses of influenza, mumps, and Newcastle disease. It is generally accepted that agents which thwart this activity of viruses may simultaneously check their infectivity. Chlorophyllin apparently accomplishes this by a direct effect on the virus as well as by preventing the viruses' occupation of red blood cell receptor sites.

By experiment, it was found that solutions of copper chlorophyllin inhibited clumping of chick red cells when the viruses were used in partially purified suspensions and also when they were precipitated with methanol and washed. In the tests, all of eleven copper chlorophyllin samples provided by Rystan Company, Mount Vernon, New York, inhibited hemagglutination by viruses of the three diseases. The sample selected for thorough testing showed no undesirable effect on the cells regardless of the concentrations used.

The chick red cell system is commonly used for assay of viruses and screening of antivirals. It is also used for the detection of antibodies in the serum of immune subjects. The ability of serum to inhibit hemagglutination is taken as evidence of immunity.





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Niacinamide	50 mg.
Pyridoxine HCl (B_6)	5 mg.
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dl-Methionine	50 mg.
Vitamin B_{12}	15 mcgm.
Liver Injection Crude	2 mcgm.**
Choline Chloride	150 mg.
Folic Acid	3 mg.
Inositol	20 mg.

**VITAMIN B_{12} ACTIVITY EQUIVALENT TO 2 MCGM. CYANOCOBALAMIN

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Highly compatible vehicle

New SERPASIL ELIXIR is compatible with Pyribenzamine® Elixir, dextro-amphetamine sulfate elixir, Antrenyl® Syrup, codeine phosphate, ephedrine sulfate, sodium salicylate and many other medications. Serpasil Elixir has a clear light-green color and a pleasant lemon-lime flavor. Each 4-ml. teaspoonful contains 0.2 mg. of Serpasil.

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When you specify the **Pfizer** antibiotic of your choice *Stress Fortified* with the B-complex, C and K vitamins recommended by the National Research Council, be sure to write **SF** on your prescription

The minimum daily dose of each antibiotic *(1 Gm. of Terramycin or Tetracyn, or 600,000 units of penicillin)* **Stress Fortifies the patient** *with the stress vitamin formula* **recommended by the National Research Council:**

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ORAL SUSPENSION (fruit flavored)
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Brand of penicillin G potassium with vitamins
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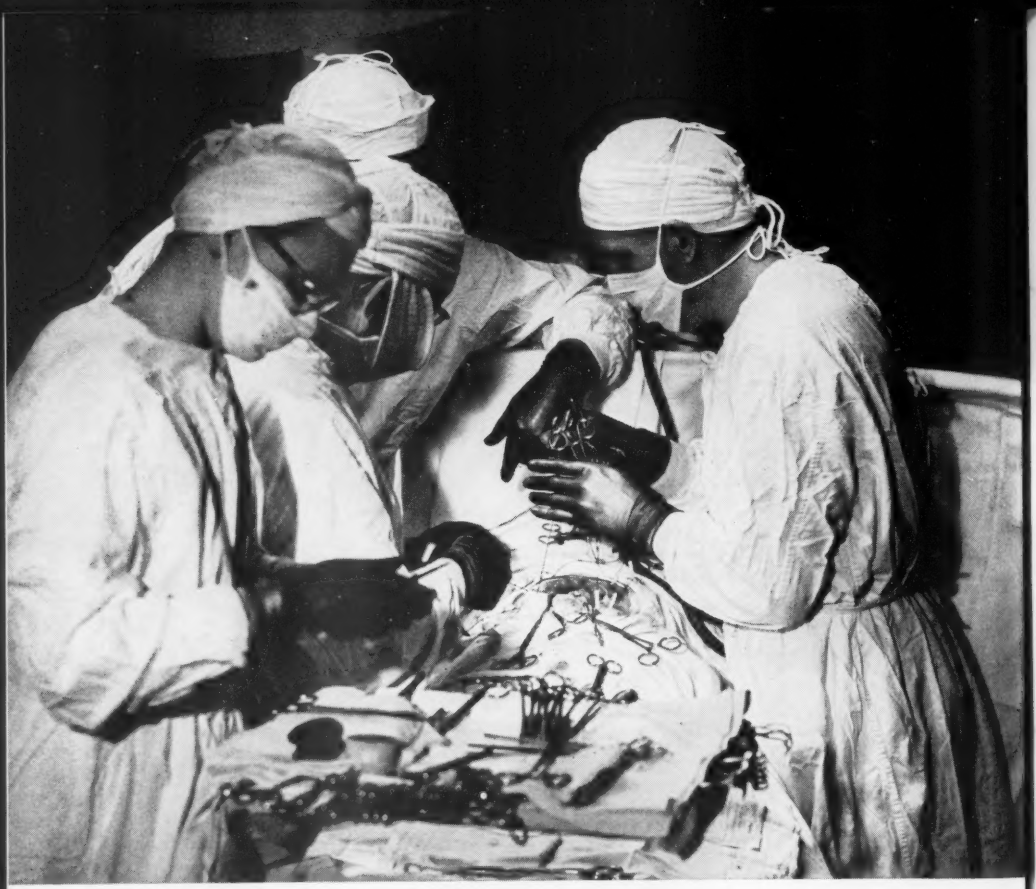

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A vital aid in reducing surgical risk is now at the disposal of every hospital, large and small. Blood volume studies by the Evans Blue technic require neither elaborate facilities nor highly trained specialists. The notion that only major institutions can run the test "is a completely false assumption," according to experience in a small Southern hospital.[1]

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The range of surgery has thus been vastly extended. Procedures which once seemed daring can now be performed — even in older patients — without fear of surgical or postoperative shock.[1,3]

1. Parsons, W. H., et al.: *Ann. Surg.* 135:791 *(June) 1952. 2. Whiting, J. A., and Hotz, R.: Surg., Gynec. & Obst.* 97:709 *(Dec.) 1953. 3. Beling, C. A.,* et al.: *Geriatrics* 7:179 *(May-June) 1952. 4. Barbour, C. M., Jr., and Tennant, R.: J. Urol.* 71:497 *(April) 1954.*

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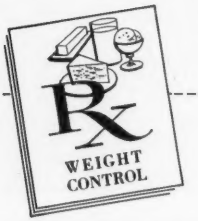

No one envies the man who must tell a woman she is overweight . . . and that the cause is overeating!

The doctor's task is easier when he prescribes a palatable diet with foods which are typical of those the entire family needs each day. Medically supervised studies on weight reduction show women . . . and men . . . losing 1½ to 2 pounds per week on diets of every-day foods which provide approximately equal weights of protein, fat, and carbohydrate. Hunger is less of a problem with this diet . . . for a combination of protein and fat in a meal slows digestion . . . and the absorption of nutrients.

The foods included in these diets provide all essential nutrients in amounts recommended for adults. Only calories are in deficit. Dairy foods are an important feature of these meals because of their high proportion of nutrients in relation to the calories they provide. Their taste appeal and variety make the diet easy to follow until the desired weight is lost.

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FIRST REPORT

The spotlight of research is being turned on Lecithin — a natural phospholipid

Physiologic Role of Phospholipids

Phospholipids or phosphatides (lecithin, cephalin, sphingomyelin) are eliciting increased interest in medicine because they apparently are intimately connected with fat metabolism, and especially the transport of lipids in the blood. They are considered to function as emulsifying agents and stabilizers for fats and fat-like substances, such as cholesterol, in the blood serum.

How vital this function is will be evident from a view generally held by investigators that instability of the lipids in the serum-lipid emulsion is one of the most important contributing causes of atheromatous deposits in vessel walls.

An excellent source of lecithin is Glidden's "RG" Oil-free Soya Lecithin, a highly purified extract containing a minimum of 95% phospholipids. It is packed in a specially designed 8 oz container to maintain its purity and freshness and is available at your drugstore.

Dosage: Investigators of lecithin have used quantities from 7.5 to 30 grams daily in divided doses. (3 teaspoonfuls equal 7.5 grams.)

Administration: "RG" Lecithin is presented in palatable granules which may be taken plain, in milk, or sprinkled on cereal.

Literature available on request.

Bibliography: 1. Duff, G. L., and Payne, T. P. B.: J. Exper. Med. *92*:299 (Oct. 1) 1950. • 2. Schettler, G.: Klin. Wchnschr. *30*:627 (July) 1952. • 3. Gertler, M. M.; Garn, S. M. and Lerman, J.: Circulation *2*:205 (Aug.) 1950. • 4. Ahrens, E. H., and Kunkel, H. G.: J. Exper. Med. *90*:409 (Nov. 1) 1949. • 5. Boyd, E. M.: Proc. & Trans. Roy. Soc. Canada *31*:11 (May) 1937. • 6. Gertler, M. M., and Oppenheimer, B. S.: Geriatrics *9*:157 (April) 1954. • 7. Kellner, A.; Correll, J. W., and Ladd, A. T.: J. Exper. Med. *93*:385 (April 1) 1951.

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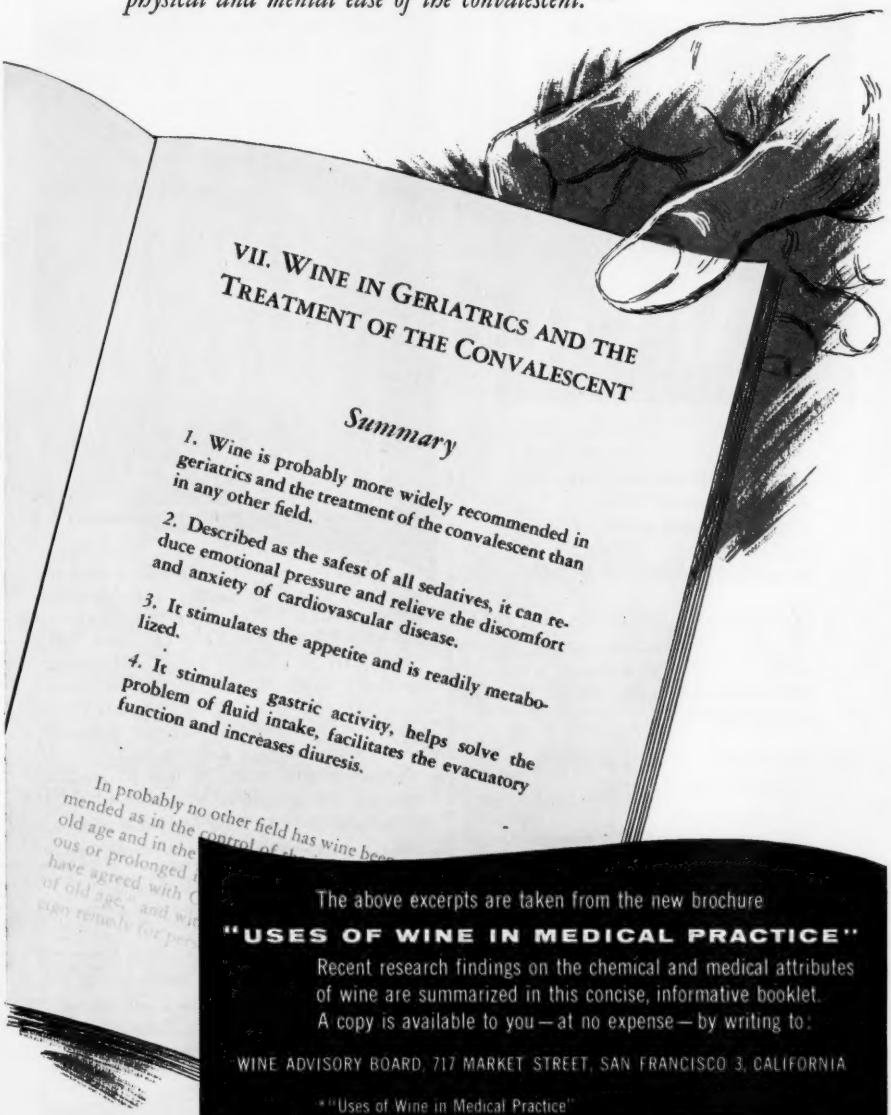
QUALITY Glidden PRODUCTS

"...prudent quantities of wine may add greatly to the pleasures of the table, to the *physical comfort and to the mental serenity of the aged,* as well as to the *generalized physical and mental ease of the convalescent.*"*



VII. WINE IN GERIATRICS AND THE TREATMENT OF THE CONVALESCENT

Summary

1. Wine is probably more widely recommended in geriatrics and the treatment of the convalescent than in any other field.

2. Described as the safest of all sedatives, it can reduce emotional pressure and relieve the discomfort and anxiety of cardiovascular disease.

3. It stimulates the appetite and is readily metabolized.

4. It stimulates gastric activity, helps solve the problem of fluid intake, facilitates the evacuatory function and increases diuresis.

The above excerpts are taken from the new brochure

"USES OF WINE IN MEDICAL PRACTICE"

Recent research findings on the chemical and medical attributes of wine are summarized in this concise, informative booklet. A copy is available to you—at no expense—by writing to:

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THE PEAKS
AND VALLEYS
OF YOUR
LABILE
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RAUVAL
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This balance makes RAUVAL the drug of choice for patients with labile hypertension, especially when accompanied by tachycardia or neurosis.[1,2]

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1. Wilkins, R. W.: Ann. Int. Med. 37:1144, Dec., 1952.
2. Wilkins, R. W., and Judson, W. E.: New England J. Med. 248:48, Jan. 8, 1953.

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1. Gardner, W. J., Anderson, R. M., and Lyden, Jr.: The Alternating Pressure Pad: An Aid to the Proper Handling of Decubitus Ulcers, Archives of Physical Medicine and Rehabilitation, (Sept.) 1954.
2. Gardner, W. J., and Anderson, R. M.: Alternating Pressure Alleviates Bed Sores. Mod. Hosp. 71:72 (Nov.) 1948.
3. Gardner, W. J.: Prevention and Treatment of Bedsores; Air Mattress Accomplishing Alternation of Pressure Points. J. A. M. A. 138:583 (Oct. 23), 1948.

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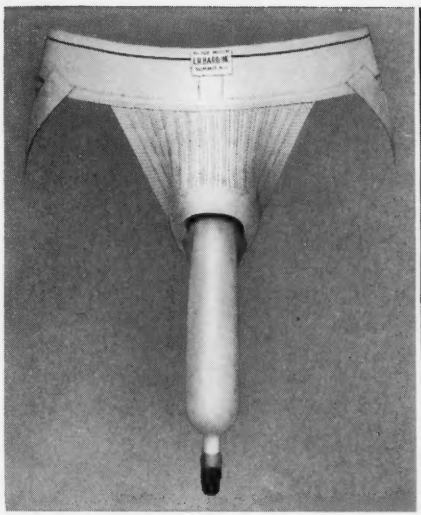

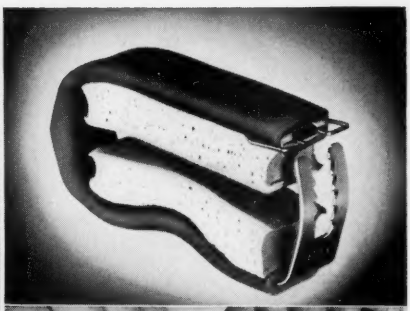

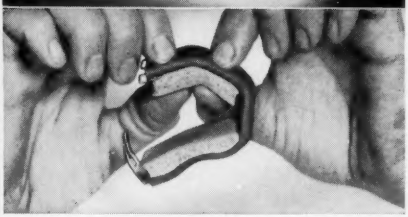

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PATIENTS welcome this new, McGuire Urinal because of its light weight and comfortable elastic belt and leg bands.

A conical penile sheath is easily cut to fit so there is no leakage even when sitting or lying down.

It is easily emptied at the bottom or attached to Bard leg bag or to bedside drainage tube.

The McGuire Urinal is available in 3 belt sizes—Small, Medium and Large. A urinal with half the capacity is available for boys.

Malleable Cunningham Clamp Easily Shaped to Fit

MANY thousands of patients have found the Cunningham Clamp effective and comfortable.

The rubber covered metal frame is easily shaped by the fingers to the proper contour. Further adjustment is possible with the ratchet catch which also guards against accidental opening.

Sponge rubber pads on top and bottom help to prevent undue restriction of blood vessels.

The Cunningham Clamp is available in four sizes—Infant, Juvenile, Regular and Large.

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from rigidity to relaxation

When the rigidity and pain of arthritis and related rheumatoid disorders prevent the patient from enjoying a normal, satisfying life, Acetycol may open a road to rehabilitation. Therapy with Acetycol provides welcome relief of pain and increases the range of pain-free movement. Thus the patient is able to resume more normal activities in his work and relaxation.

The effectiveness of Acetycol is based on synergism between aspirin and para-aminobenzoic acid. The combination of these two agents produces high salicylate blood levels on relatively low dosages. Salicylated colchicine extends the effectiveness to cases of a gouty nature.

Acetycol also contains three essential vitamins often lacking in older patients: ascorbic acid, to prevent degenerative changes in connective tissue; thiamine and niacin, for carbohydrate utilization and relief of joint pain and edema.

Usual dosage—1 or 2 tablets three or four times a day.

Each Acetycol tablet contains:

Aspirin	325.0 mg.
Para-aminobenzoic acid	162.0 mg.
Colchicine, salicylated	0.25 mg.
Ascorbic acid	20.0 mg.
Thiamine hydrochloride	5.0 mg.
Niacin	15.0 mg.

Supplied: Bottles of 100 and 500.

Acetycol

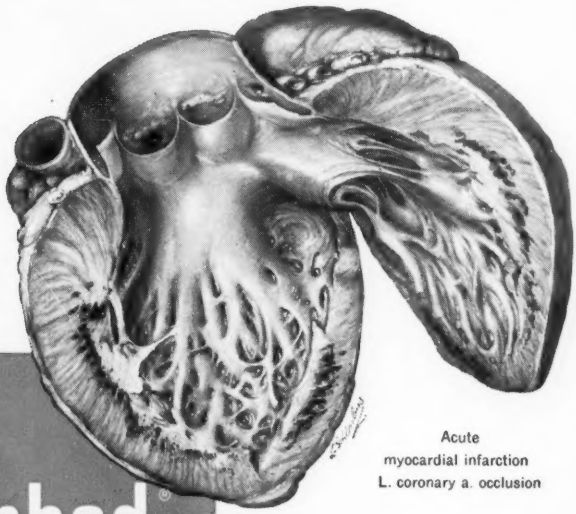
TRADEMARK

to relieve rheumatic pain

WARNER-CHILCOTT

—in the severe shock 60 50

secondary to myocardial infarction



Acute
myocardial infarction
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Levophed®

BITARTRATE

..... may be life-saving

A series of 14 cases of severe shock accompanying myocardial infarction was treated by various methods. All of the 6 patients who received Levophed recovered despite the presence of congestive heart failure.[1]

The practically instant pressor effect of Levophed—within 10 to 30 seconds—may usually be maintained at desired levels almost indefinitely.

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1. Gazes, P. C., Goldberg, L. I., and Darby, T. D.: *Circulation*, 8: 883, Dec., 1953.

Levophed bitartrate, brand of levarterenol bitartrate

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1. Balfour, D. C., Jr.: Am. J. Gastroenterol. 22:181, 1954. 2. Burke, J. O., et al.: Internat. Rec. Med. & Gen. Practice Clin. 167:587, 1954. 3. Sternberg, S. D., and Greenblatt, I. J.: Ann. Allergy 9:190, 1951.

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